

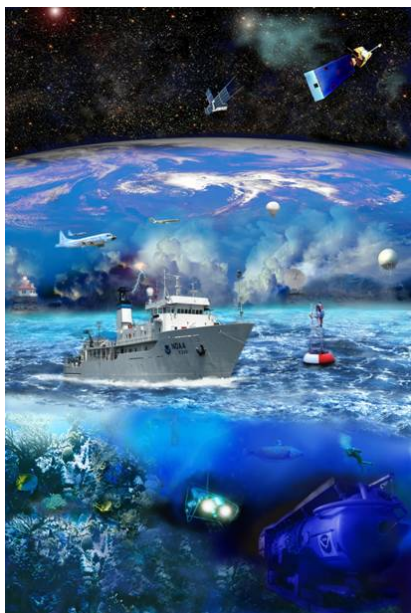


Global Climate Observing System (GCOS) Coordination Meeting at NCDC August 22-23, 2006



Introduction and U.S. GCOS Program Overview

August 22, 2006



Howard J. Diamond

Program Manager, U.S. GCOS & NOAA IPRC

NOAA's National Climatic Data Center

1335 East-West Hwy, Rm 7214

Silver Spring, MD 20910-3283

ph: +1-301-713-1283

fax: +1-301-713-0819

cell: +1-301-801-4855

Howard.Diamond@noaa.gov



Presentation Agenda



- **Purpose**
- **Agenda**
- **Meeting Output**
- **International Structure of GCOS**
- **U.S. GCOS Program**
 - **Pacific Islands Regional and Bilateral Support Activities**
 - **U.S. GCOS Program to Advance GCOS in Other Regions**
 - **Africa**
 - **South Asia, Eastern Europe**
 - **South America**
- **US GCOS Web Site**

A View from the NOAA Climate Program Office in Silver Spring, Maryland – “*This Global Warming Thing is Really Getting Out of Hand*”



Purpose

As official Lead, Archive, and Analysis Centers for GCOS, as well as in its role as World Data Center for Meteorology, NCDC has been called upon to work on a number of GCOS data and program activities. As such there are a number of people at NCDC working on various GCOS activities going on at NCDC, and it is not always clear to those involved how all those roles fit together.

Additionally, since Howard Diamond is assigned as the overall US GCOS Program Manager, but is based in Silver Spring, it was believed that a review of these activities would give him, and others, an opportunity to see all that is going on at NCDC regarding GCOS, and might also offer the opportunity to identify possible improvements and a better coordination of activities.

AGENDA

Day 1: Tuesday August 22nd

9:00 am - Introduction: Wayne Faas/Howard Diamond

9:30 am – US GCOS Program Overview – H. Diamond

10:00 am – AOPC Role in Requesting NCDC GCOS Activities – Tom Peterson

10:30 am – Break

GCOS Surface Network – Country Interactions as part of the GCOS Lead Center

10:50 am - Quest for Historical GSN Daily Data – Greg Hammer

11:10 am - Quest for Real-Time GSN CLIMAT data – Larry Nicodemus

11:30 am - Coordinating these activities with other GCOS Lead Centers – Larry Nicodemus/Greg Hammer

Noon – Lunch

GCOS Surface Network – Data Processing – current and near future

Daily data:

1:00 pm - Ingesting GSN Daily Data – current system and obstacles experienced– Ron Ray

1:30 pm - Ingesting GSN Daily Data and making them part of GHCN Daily – Byron Gleason/Russ Vose

2:00 pm - Making GSN Daily Data (and monthly) that are part of GHCN Daily (and monthly) available via customer service – Neal Lott

Monthly Data:

2:30 pm - CLIMAT/CLIMAT Temp Data Collection (MCDW) – William Angel

3:00 pm – Break

3:15 pm - GHCN Monthly data activities including plans to make GSN Monthly data available via customer service – Anthony Arguez/Russ Vose

AGENDA (Cont)

GCOS Upper Air Network

3:45 pm - Quest for historical GUAN metadata (as part of the GCOS Lead Center activities) – Greg Hammer

4:15 pm - Data processing – ingest, archive and delivery as part of IGRA – Larry Griffin and Imke Durre

(1) ingest of NCEP coded message data and conversion to DSI6300 format for IGRA.

(2) GUAN Summary reports extrapolated from data in (1).

(3) GSN reports summarizing Integrated Surface Hourly (ISH) and CLIMAT data.

GCOS Analysis Center

4:45 pm - GSN and GUAN Statistical Data Collection – Larry Griffin/Helen Frederick

5:15 pm – Adjourn for the Day

Day 2: Wednesday August 23rd

8:30 am - Providing GSN and GUAN statistical information via Health of the Network – Helen Frederick/Matt Menne

9:00 am - Role of the Global Observing System Information Center – Christina Lief

9:30 am - Role of the CBS Rapporteur for GCOS – Matt Menne

10:00 am - The GCOS Secretariat's Perspective – Dick Thigpen

10:30 am - Break

10:45 am - The Way Forward – Diamond/Peterson/Faas Facilitators

Discussion of how to better coordinate the various roles

Discussion of a plan to document & better coordinate the NCDC GCOS roles

Review of Action items and Way Forward

Noon - Adjourn

Meeting Output

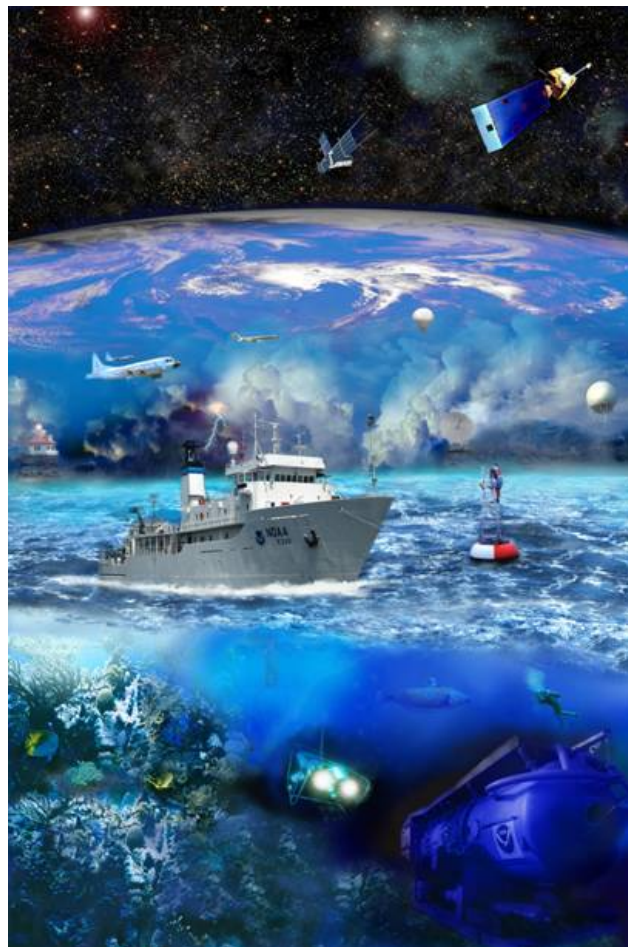
At the conclusion of this meeting, I would hope that in addition to people at NCDC getting a better idea of the diverse GCOS roles at the center, that we can develop a relatively short working document (10-15 pages) fully documents the various GCOS roles at NCDC.

As such, I will ask every presenter to please provide me a short description (about a page) that describes their GCOS role for NCDC. [Due by September 12th to Howard]

Post that document and GCOS roles document on a section of the US GCOS home page

Plan for future GCOS reviews at NCDC as appropriate (perhaps on an annual basis, or as deemed required)

Part I - Global Climate Observing System (GCOS) –Global Perspective



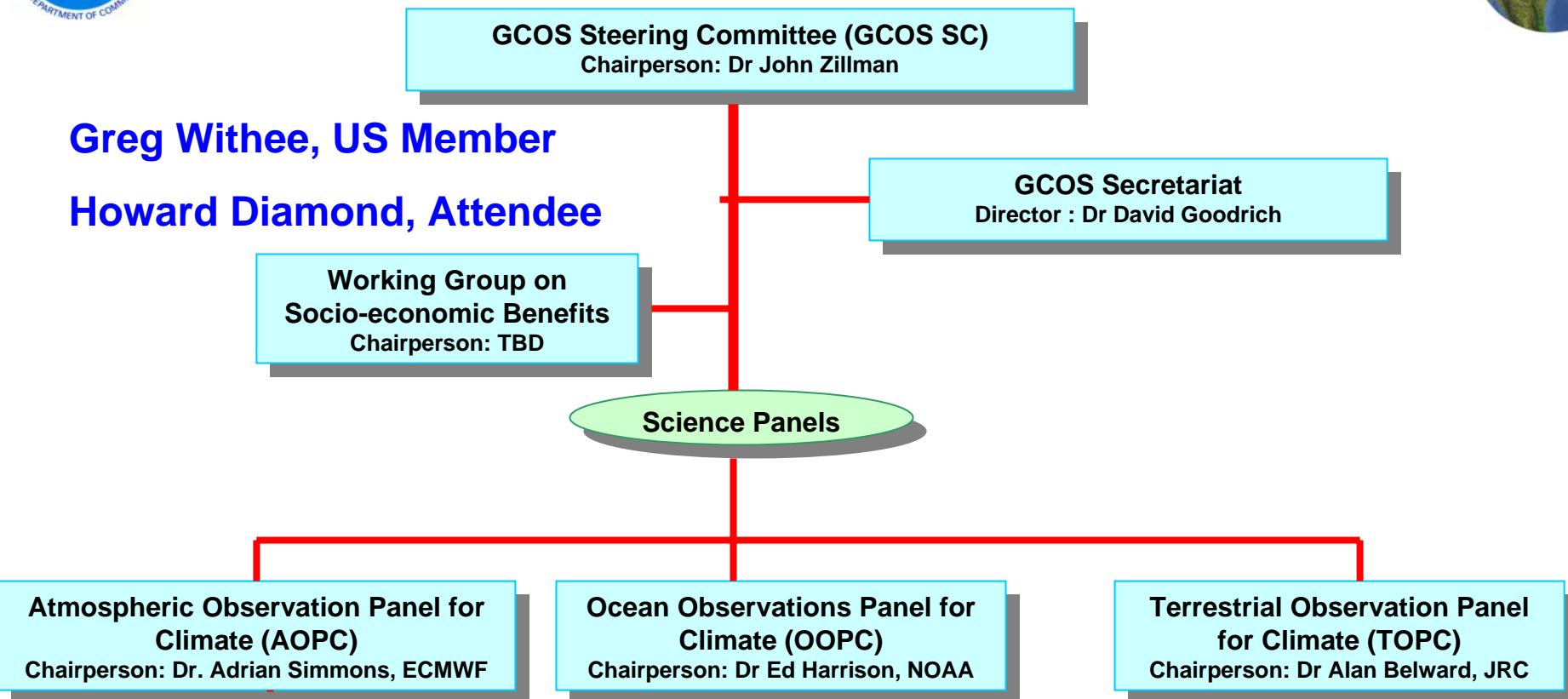


INTERNATIONAL BACKGROUND TO GCOS

- ◆ **Second World Climate Conference (Nov. 1990)**
- ◆ **UN Conference on Environment and Development (UNCED June 1992)**
- ◆ **Intergovernmental Meeting on World Climate Programme (April 1993)**
- ◆ **Four International Sponsors:**
 - ◆ **WMO**
 - ◆ **ICSU**
 - ◆ **IOC/UNESCO**
 - ◆ **UNEP**
- ◆ **GCOS Secretariat based at WMO in Geneva**
- ◆ **Background and documents at <http://gosic.org>**
- ◆ **Second Adequacy Report for GCOS, April 2003, and important milestone for the program**
- ◆ **GCOS Cooperation Mechanism established October 2003**



INTERNATIONAL GCOS STRUCTURE



Greg Withee, US Member

Howard Diamond, Attendee

Tom Peterson, US Member

WMO GCOS Office Home Page
<http://www.wmo.ch/web/gcos/gcoshome.html>



THE SECOND REPORT ON THE ADEQUACY OF THE GLOBAL OBSERVING SYSTEMS FOR CLIMATE IN SUPPORT OF THE UNFCCC

April 2003

GCOS – 82

(WMO/TD No. 1143)

UNITED NATIONS
ENVIRONMENT PROGRAMME

INTERNATIONAL COUNCIL FOR
SCIENCE

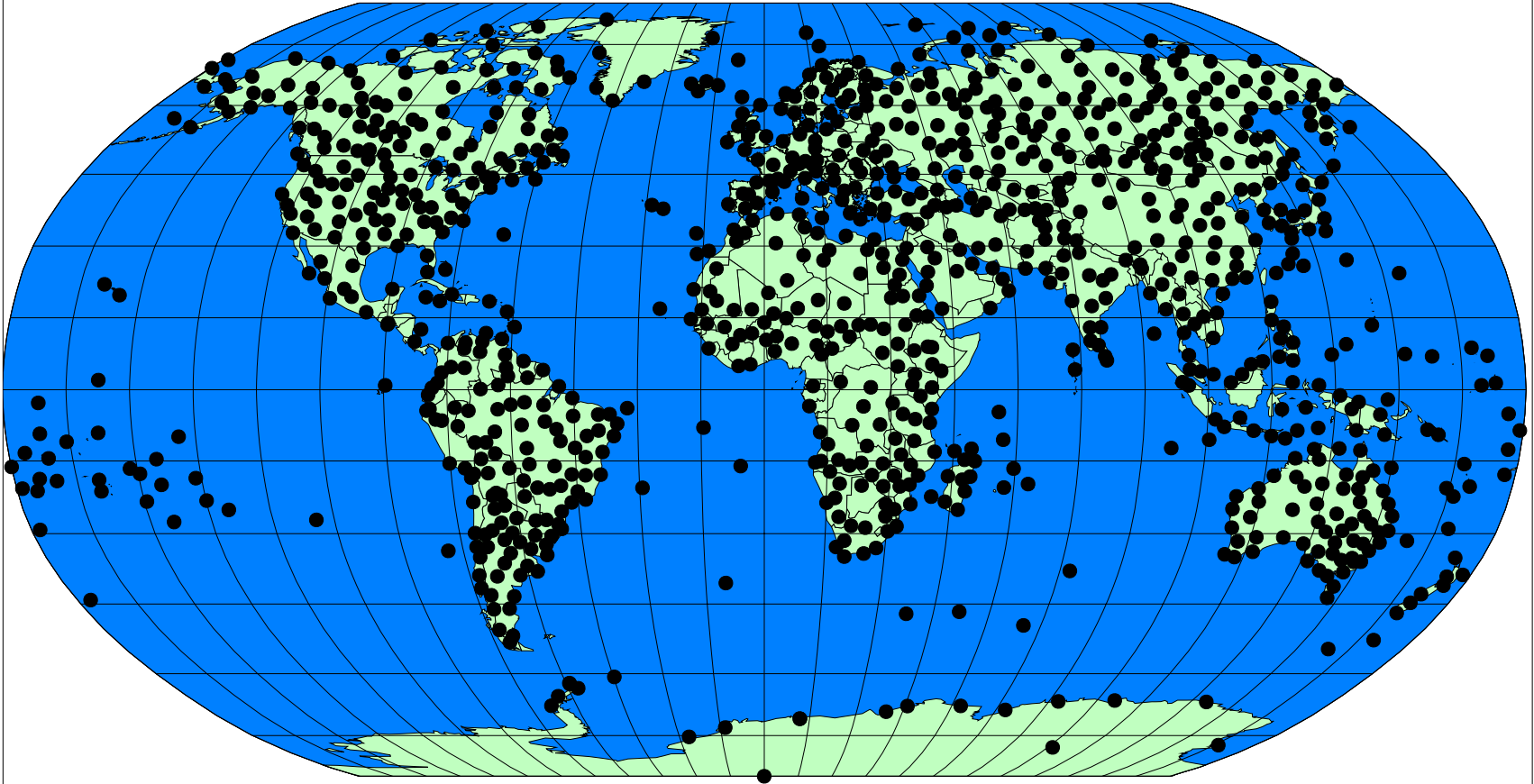
Networks in the Adequacy Report

- ◆ Reaffirms primary importance of GSN and GUAN
- ◆ Refines GCOS strategy for water vapor, clouds, aerosols and trace species
- ◆ Supports proposed initial Global Ocean Observing System for Climate
- ◆ Defines a focus for the global monitoring of key terrestrial variables for climate
- ◆ In all domains seeks to exploit full potential of satellite data

Domain	Essential Climate Variables
Atmospheric (over land, sea and ice)	<p>Surface: Air temperature, Precipitation, Air pressure, Surface radiation budget, Wind speed and direction, Water vapor.</p> <p>Upper-air: Earth radiation budget (including solar irradiance), Upper-air temperature (including MSU radiances), Wind speed and direction, Water vapor, Cloud properties.</p> <p>Composition: Carbon dioxide, Methane, Ozone, Other long-lived greenhouse gases, Aerosol properties.</p>
Oceanic	<p>Surface: Sea-surface temperature, Sea-surface salinity, Sea level, Sea state, Sea ice, Current, Ocean color (for biological activity), Carbon dioxide partial pressure.</p> <p>Sub-surface: Temperature, Salinity, Current, Nutrients, Carbon, Ocean tracers, Phytoplankton.</p>
Terrestrial	<p>River discharge, Water use, Ground water, Lake levels, Snow cover, Glaciers and ice caps, Permafrost and seasonally-frozen ground, Albedo, Land cover (including vegetation type), Fraction of absorbed photosynthetically active radiation (FAPAR), Leaf area index (LAI), Biomass, Fire disturbance.</p>

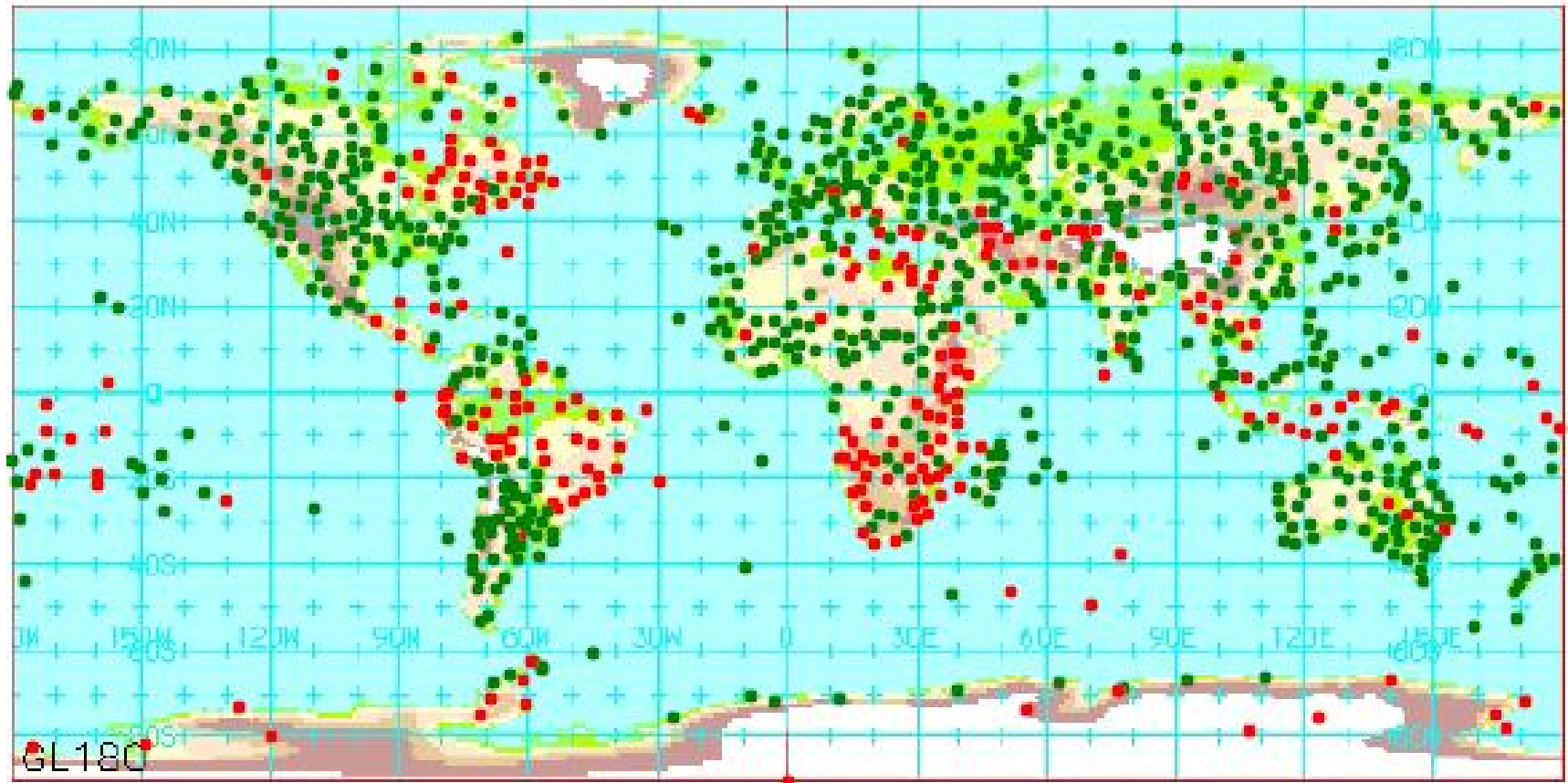
GCOS Surface Network (GSN)

981 Stations



GSN: Performance Monitoring

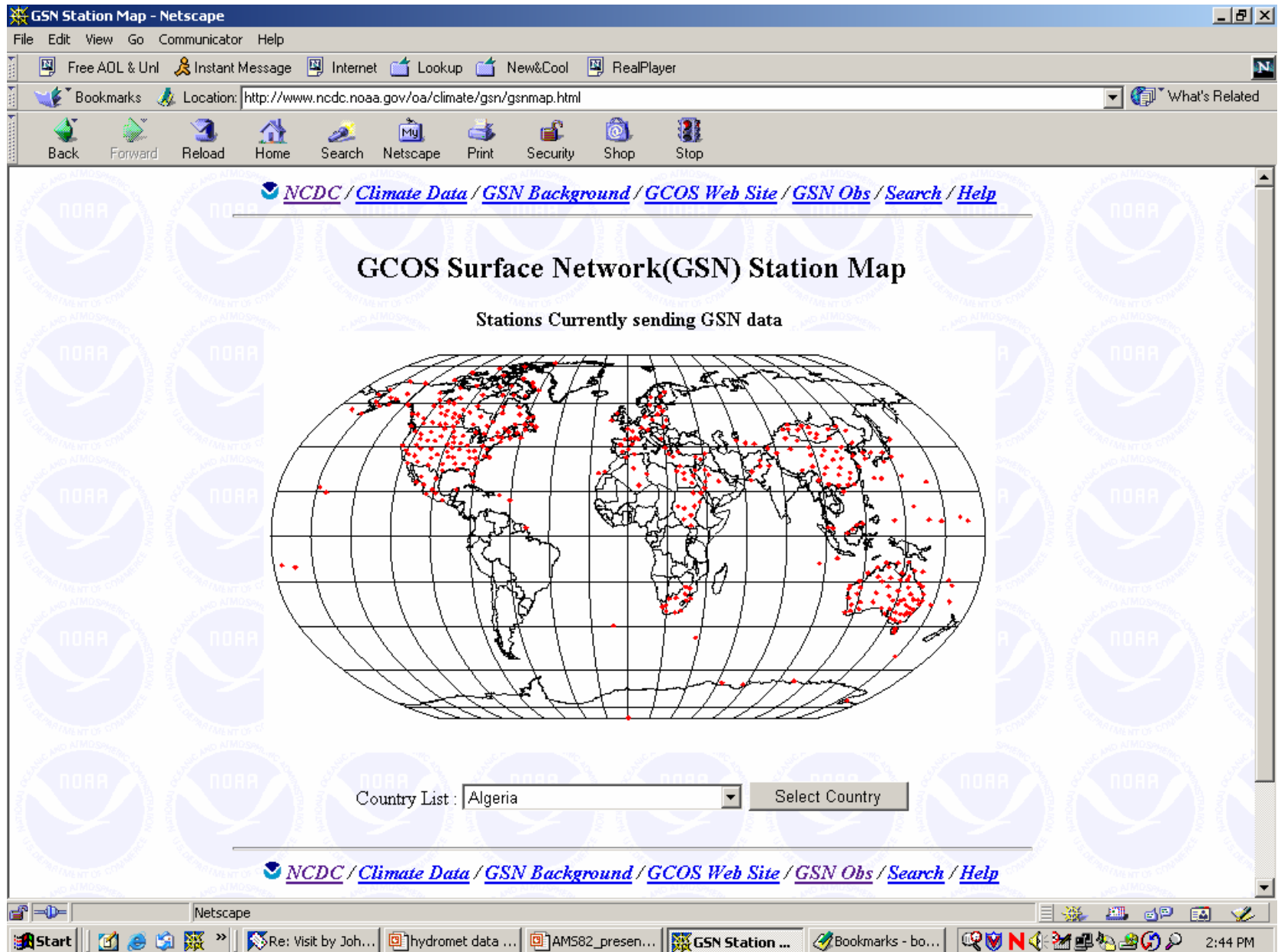
Percentage of received CLIMAT-Reports
Selection: GSN-stations from April 2005



- | | | |
|-------------------------|-------------------------|-------------------------|
| ● 100% rec. (761 St.) | ● 76 - 99% rec. (0 St.) | ● 51 - 75% rec. (0 St.) |
| ● 26 - 50% rec. (0 St.) | ● 1 - 25% rec. (0 St.) | ● not rec. (245 St.) |

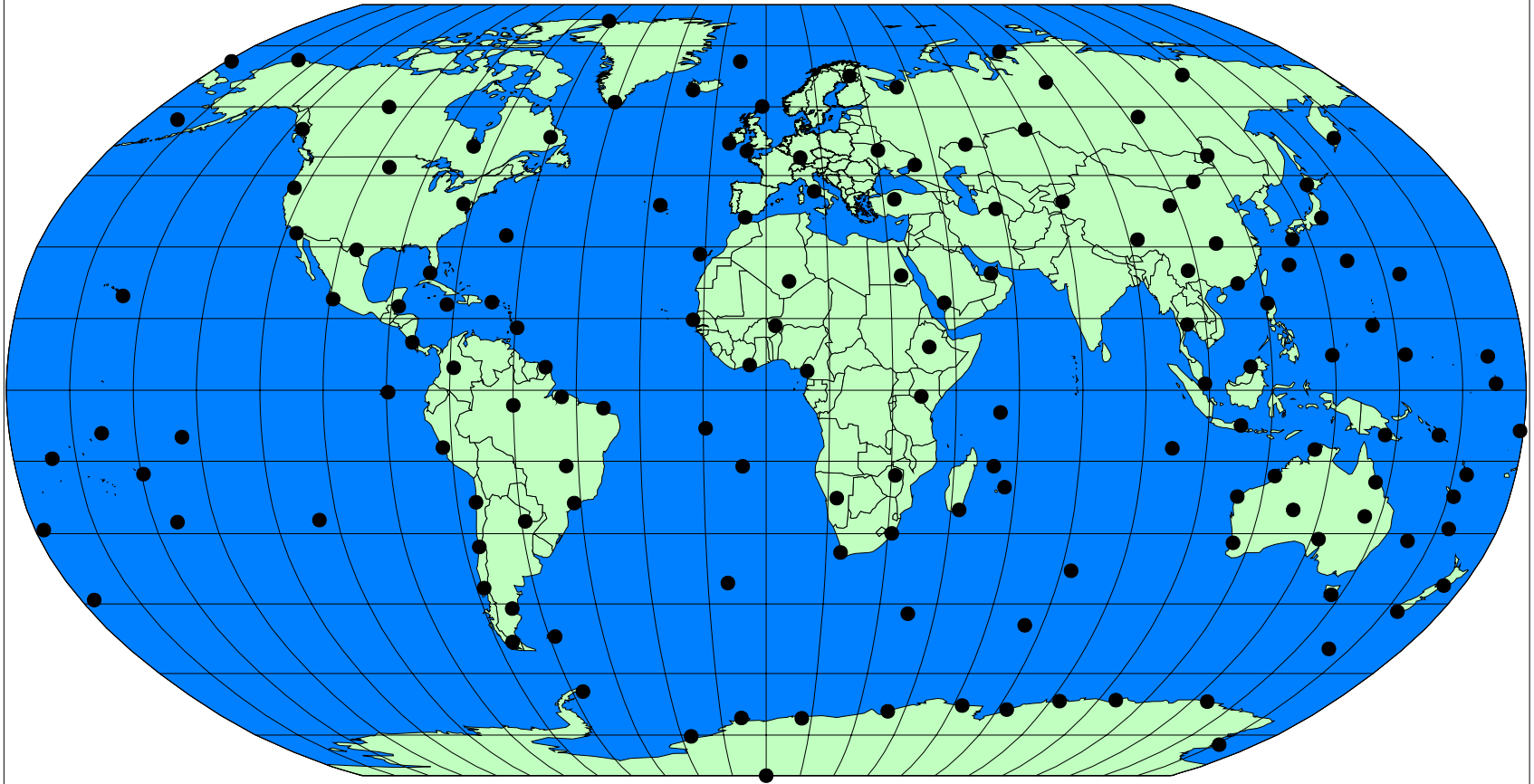
rec.: received until 20th day of a month following the month to be monitored

<http://www.ncdc.noaa.gov/gsn/gsn>

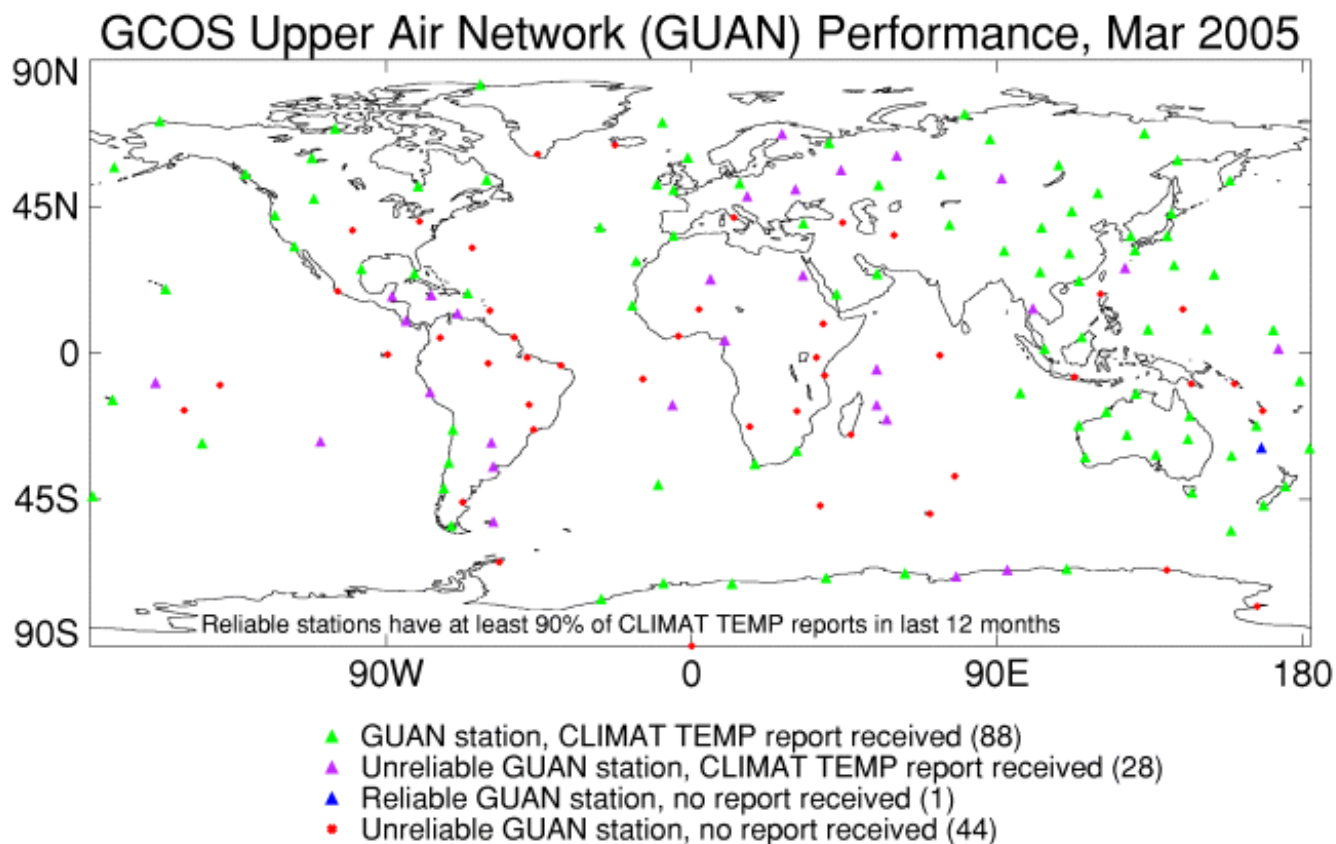


GCOS Upper Air Network (GUAN)

152 Stations

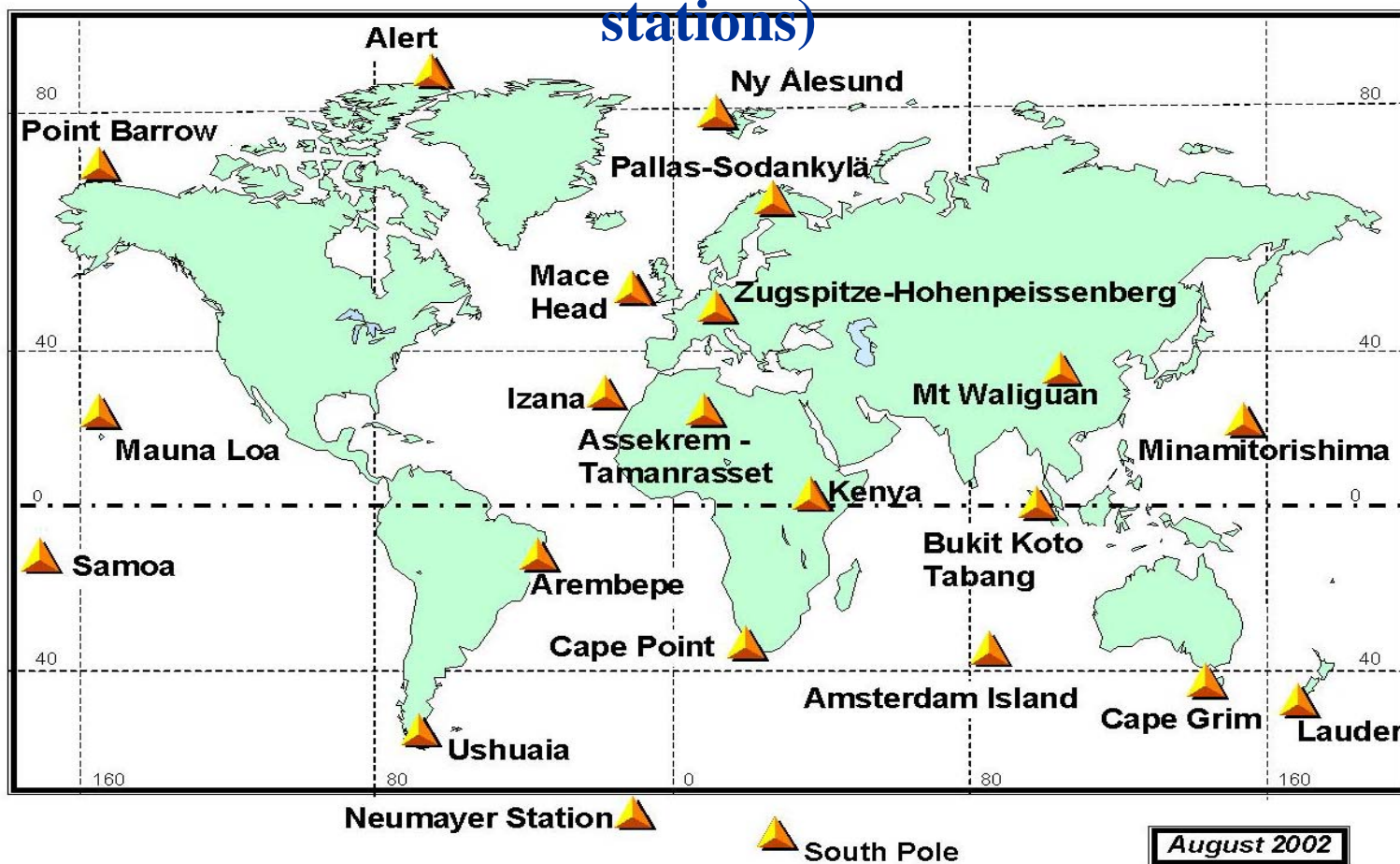


GCOS Upper Air Network (GUAN)



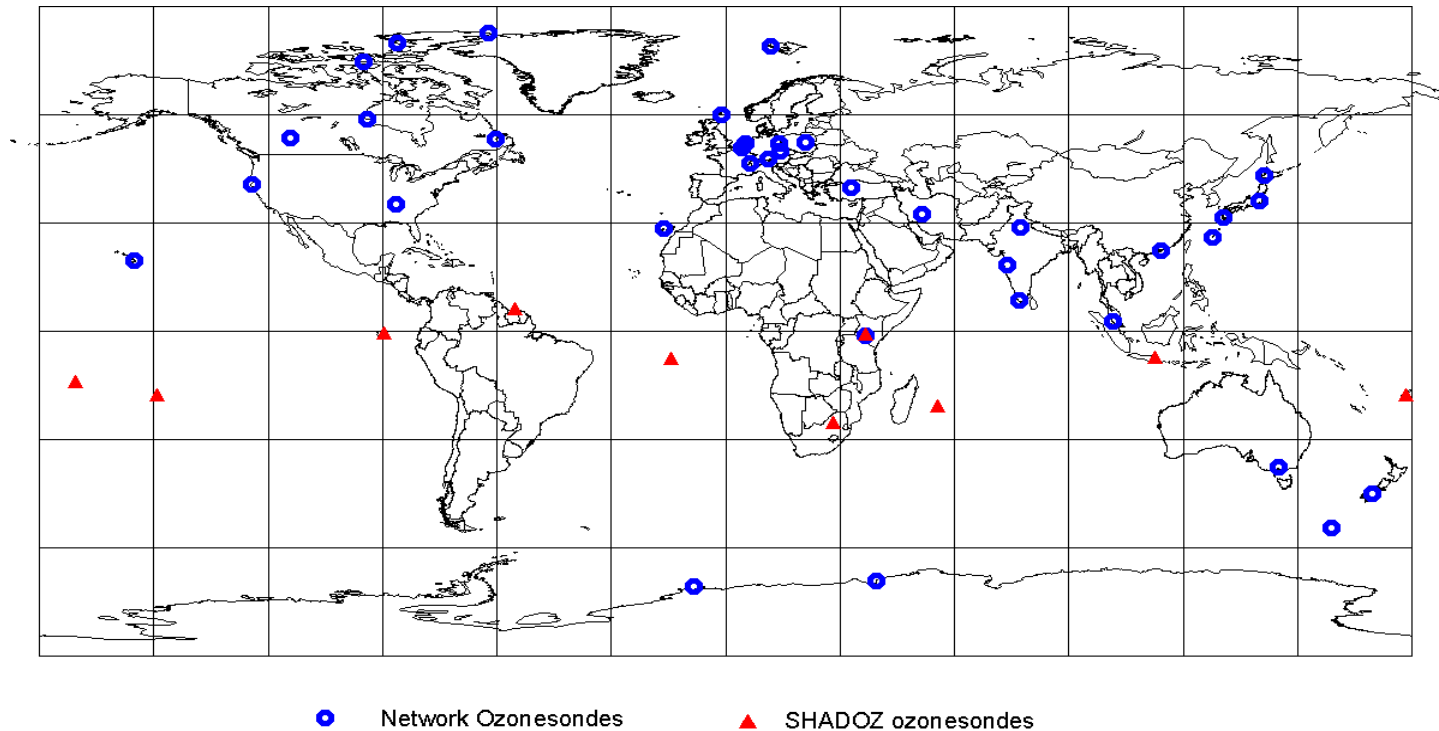
GAW GLOBAL MONITORING STATIONS: COMPREHENSIVE MEASUREMENTS LONG TERM

However: The GAW Network is Much Bigger When Regional Stations Are Included (e.g., regional ozone stations)



ESTIMATED GLOBAL OZONESONDE NETWORK: 2003

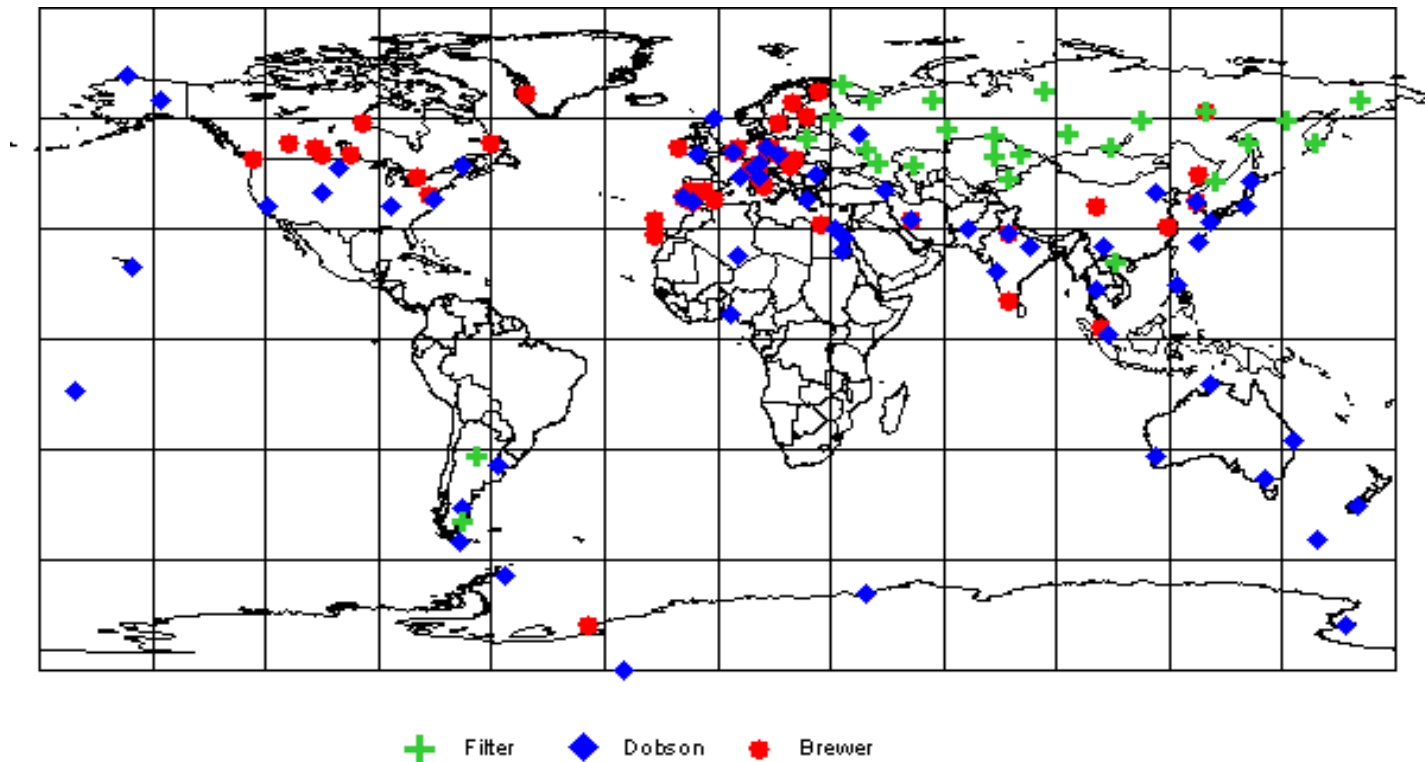
Stations with data submitted since at least 1 Jan
1999



Compliments of WOUDC, Toronto Ed Hare Manager. Note that this map changes constantly as data is submitted to the data centre. Suggestions to correct any omissions are welcome by GAW. The red symbols represent sites of contributing partner NASA/SHADOZ.

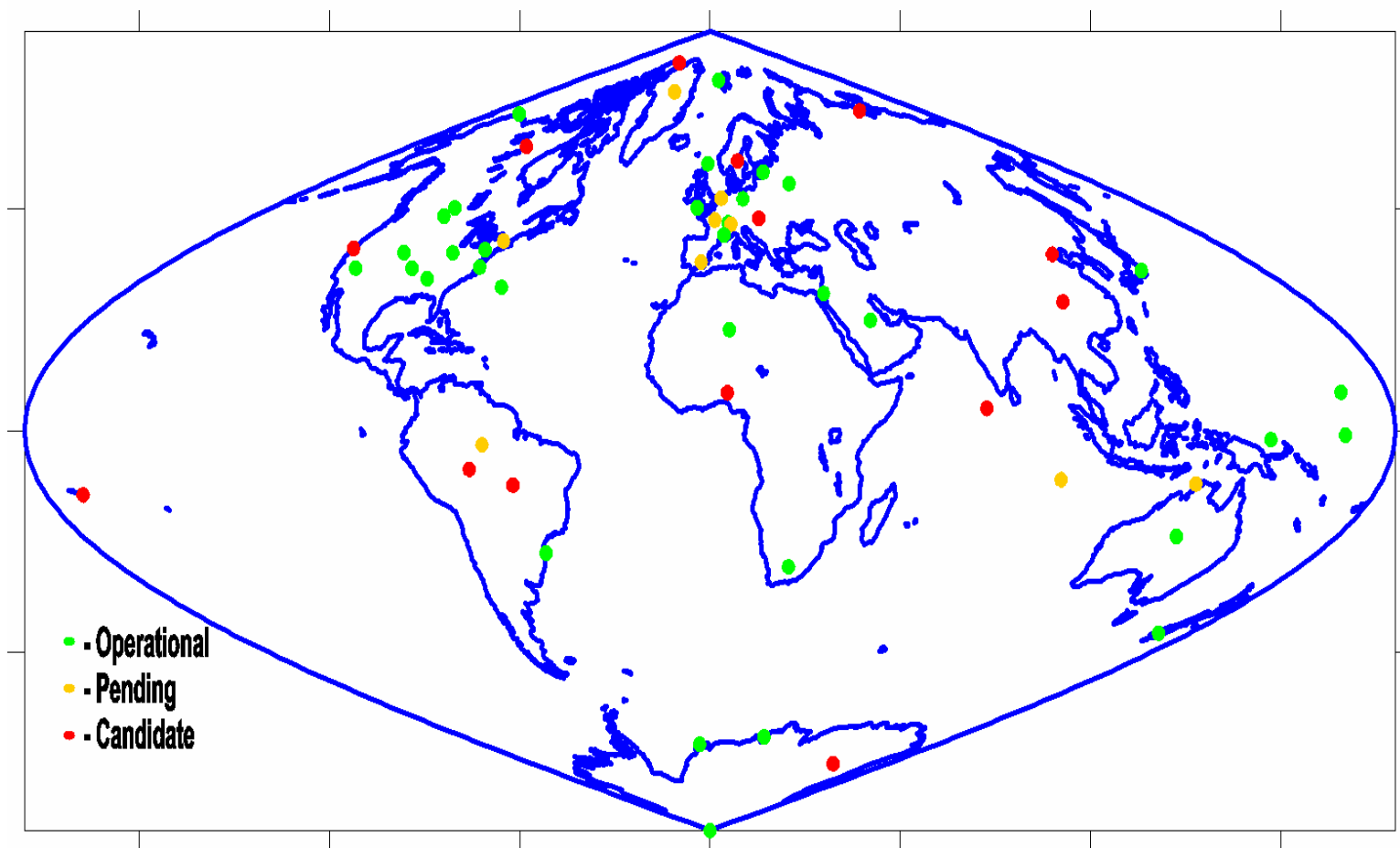
ESTIMATED GLOBAL COLUMN OZONE NETWORK: 2003

Stations with data submitted since at least 1
Jan 1999

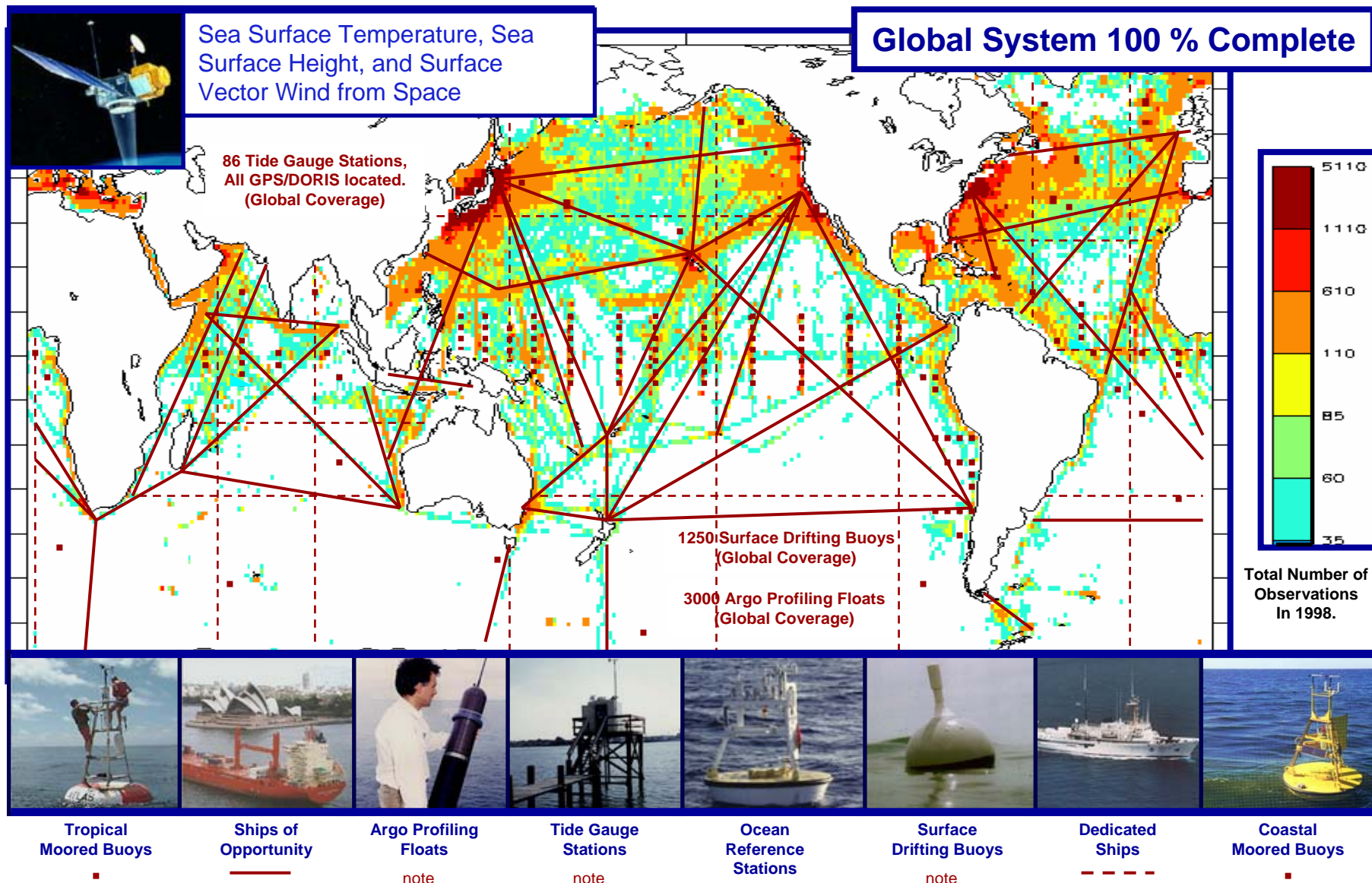


Compliments of WOUDC, Toronto Ed Hare Manager. Note that this map changes constantly as data is submitted to the data centre. Suggestions to correct any omissions are welcome by GAW. The symbols represent different instrument types.

International BSRN Station Status, Oct 2004



The Future Sustained Ocean Observing System for Climate -- Target 2008





GCOS OBSERVING NETWORKS

◆ TERRESTRIAL OBSERVATIONS:

Climate Components of:

- 📄 Carbon Flux (FLUXnet)
- 📄 Hydrology (GTN-H) [proposed]
- 📄 Permafrost (GTN-P)
- 📄 Glaciers (GTN-G)
- 📄 Coral Reef Monitoring (e.g., Hotspot Monitoring)
- 📄 Coastal Observations (e.g., IOOS)
- 📄 Other Paleoclimate Proxies

Global Observing System Information Center (GOSIC)

<http://gotic.org>



Home Page for the Global Observing Systems Information Center - Netscape

File Edit View Go Communicator Help

Free AOL & Unl Instant Message Internet Lookup New&Cool RealPlayer

Bookmarks Location: <http://gotic.org/> What's Related

Back Forward Reload Home Search Netscape Print Security Shop Stop

GOSIC

Global Observing Systems Information Center

Facilitating Access to Global Observing Systems Data & Information

The Global Observing Systems Information Center

GOSIC provides access to data and information, and overviews of the structure and programs for the Global Climate Observing System (GCOS), the Global Ocean Observing System (GOOS), and the Global Terrestrial Observing System (GTOS)

Data and Information:

- Access Data and Information from the Integrated Observing Systems (IOS) Networks established by: [GCOS](#) | [GOOS](#) | [GTOS](#) |
- Access Maps displaying information such as, data, locations of observing sites, geographic coverage and status of data collection or some other characteristic of the observing networks. | [Maps](#) |
- National Commitments are described in terms of programs, measurement types and observing sites and schedules | [GOOS](#) |

Dataset Registry:

- Access Data in the GOSIC Dataset Registry either by searching the NASA Global Change Master Directory ([GCMD](#)) or by listing the GOSIC Database G3OS datasets: | [Search/List](#) |

Program Information:

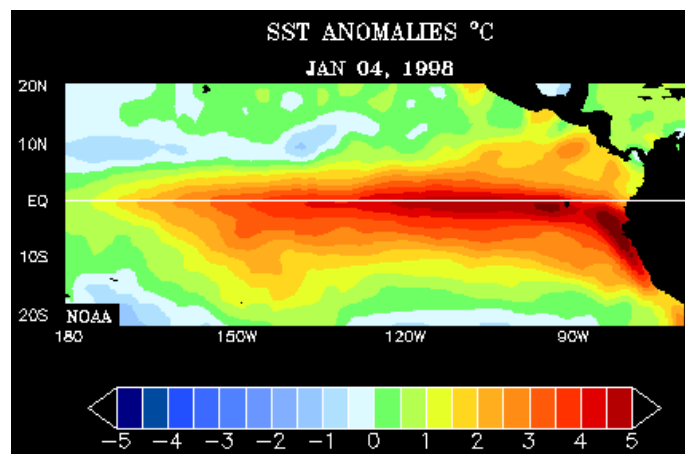
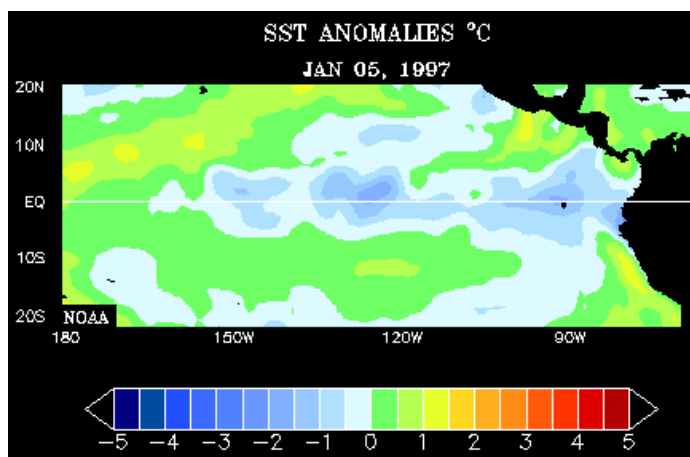
- Review the scientific and technical basis for the design of the observing systems | [GCOS](#) | [GOOS](#) | [GTOS](#) | [GOSIC](#) | [G3OS](#) |

Home
What's New
About GOSIC
GCOS
GOOS
GTOS
Maps
Search
Publications
Acronyms
Contact Us

<http://gotic.org/default.htm>

Start AirCard 555 Watcher Will be on Leave - Inbox ... Home Page for the GL... Microsoft PowerPoint - ... 8:19 AM

Part II – U.S. GCOS Regional Efforts in the Pacific Islands





The Pacific: Regional Issues

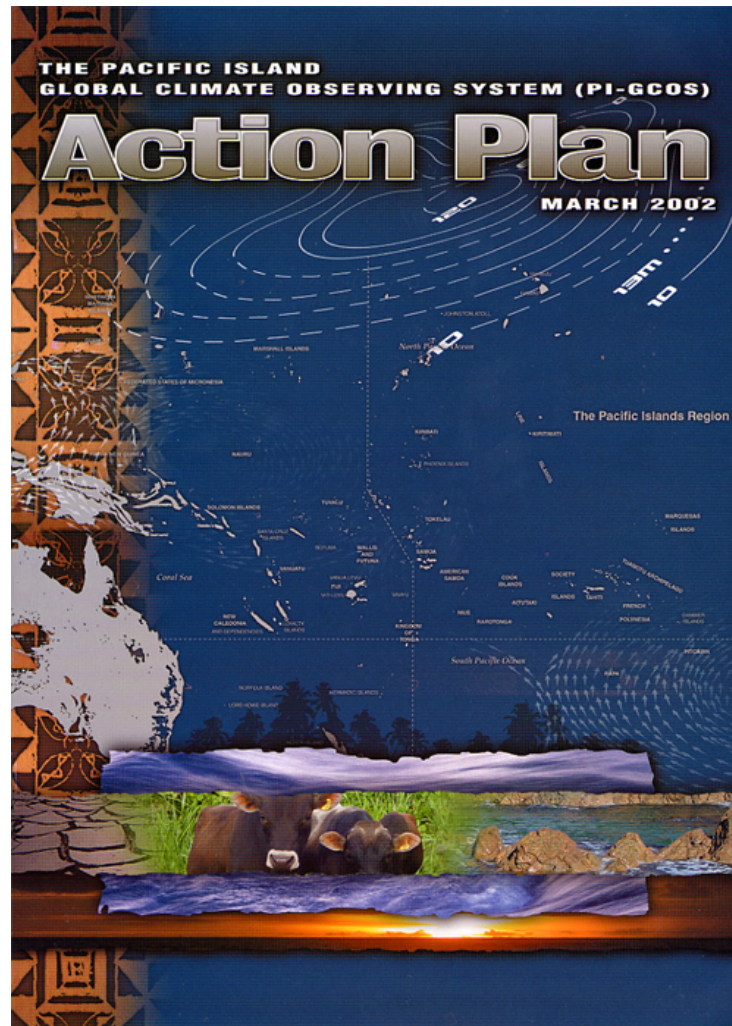


- **Unique fragile environments**
- **Largest ocean in the world & of economic importance to Pacific Island Countries**
- **Limited natural resources & low economic diversification**
- **Geographic isolation of PICs**
- **Frequent natural disasters (eg. tropical cyclones, flooding, tsunamis)**
- **Susceptible to impacts of climate variability (eg ENSO) & change (eg sea level rise)**
- **Lacking an ability to locate, catalogue & disseminate information**
- **Desperate need for integrated marine/coastal/water management**

Pacific Islands (PI) GCOS and GOOS



PI-GCOS Regional Action Plan



PI-GCOS Web Site:

<http://pi-gcos.org>

PI-GCOS Home Page - Netscape

File Edit View Go Communicator Help

Free AOL & Unl Instant Message Internet Lookup New&Cool RealPlayer


Bookmarks Location: <http://www.pi-gcos.org/> What's Related

Back Forward Reload Home Search Netscape Print Security Shop Stop


Pacific Islands Global Climate Observing System (PI-GCOS)

PI-GCOS — Establishing a robust and sustainable Pacific Island GCOS that meets the long-term climate observation needs of the region and the world

What is GCOS?



PI-GCOS ACTION PLAN
RECENT NEWS



Document: Done

Start OCP chapter "0... Search Messages PI-GCOS Hom... C:\My Documen... Pacific GCOS Bri... Pacific Island G... 9:46 PM



US/NZ Bi-Lateral Climate Activities Related to GCOS

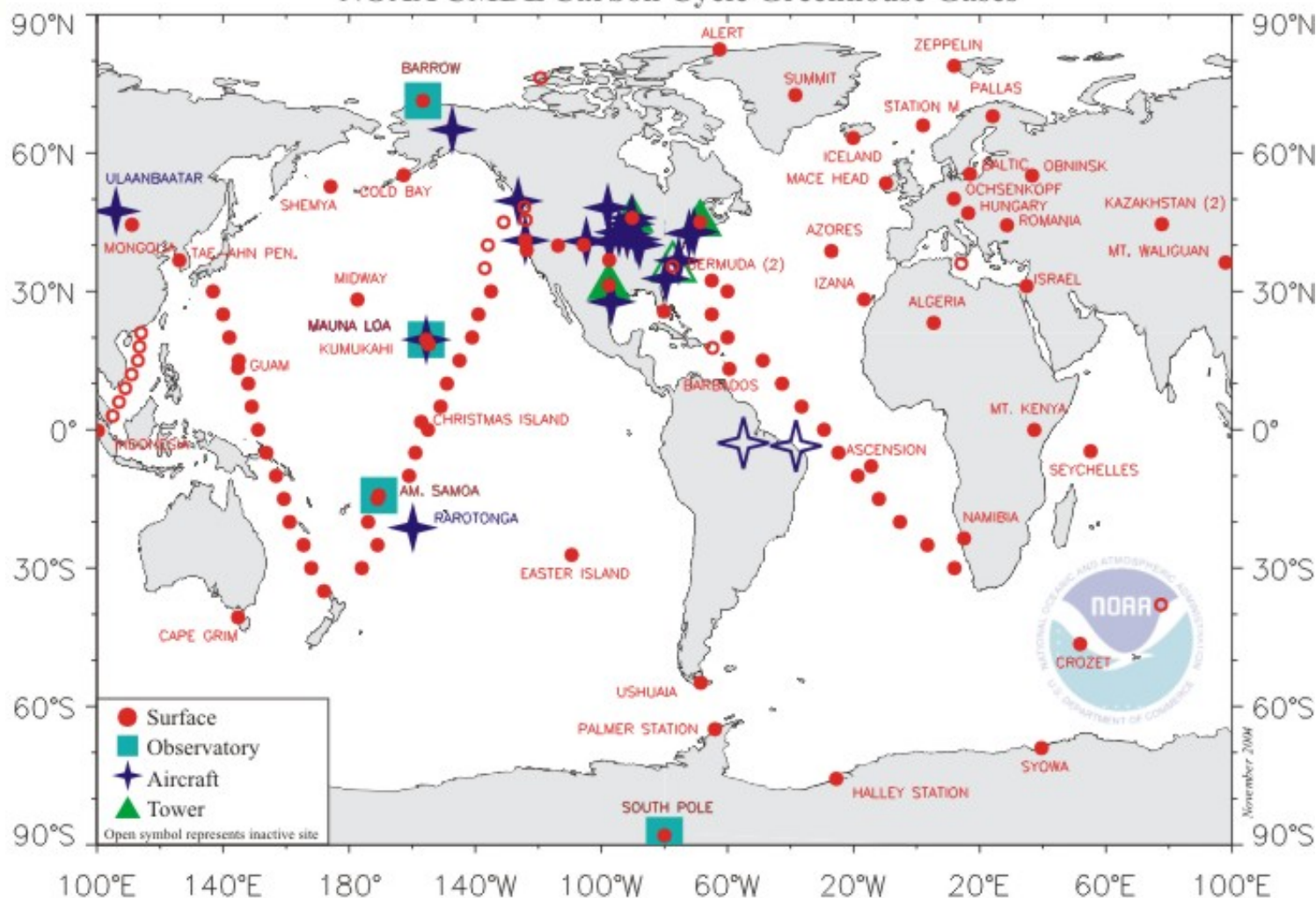


Bi-Lateral Climate Change Partnership signed July 2003, updated in July 2004 and July 2005

- **Proposed Flask Sampling From a Ship Plying The Western Pacific for CO₂ Measurements in the Southern Ocean**
- **Stratospheric Water Vapor Profiles at Lauder, New Zealand**
- **Data Rescue of Pacific Islands Climate Data**
- **Improved climate monitoring systems for the Pacific (GCOS)**
- **Improved ocean climate observations for the Pacific (GOOS)**
- **Pacific Basin Information Forum [new for 2005; USGS and NOAA]**
- **Dobson Spectrophotometer Measurements of Stratospheric Ozone**
- **Network for the Detection of Stratospheric Change (NDSC)**
- **Surface Ozone Measurement Project at South Pole**

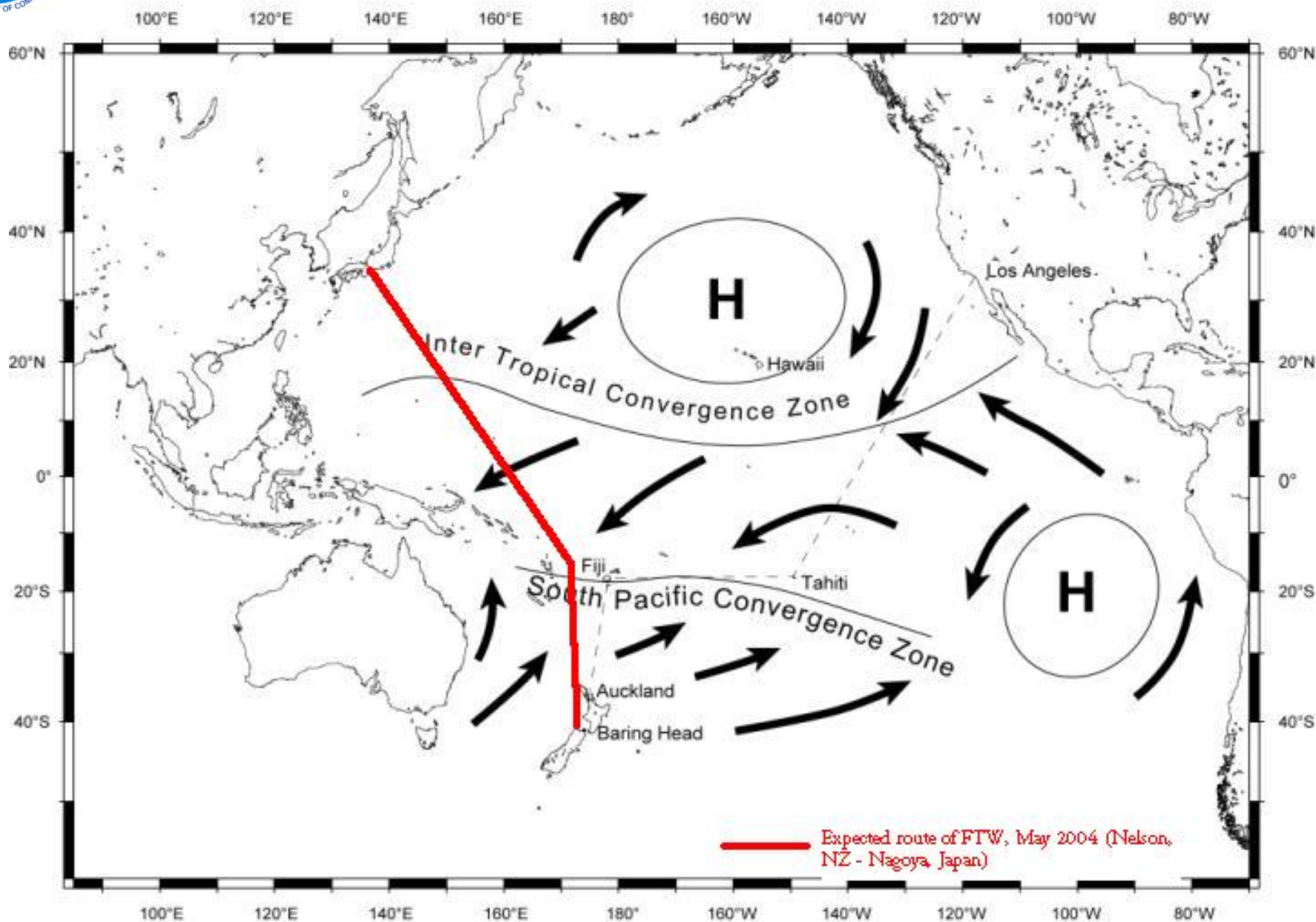
Measurement Programs

NOAA CMDL Carbon Cycle Greenhouse Gases

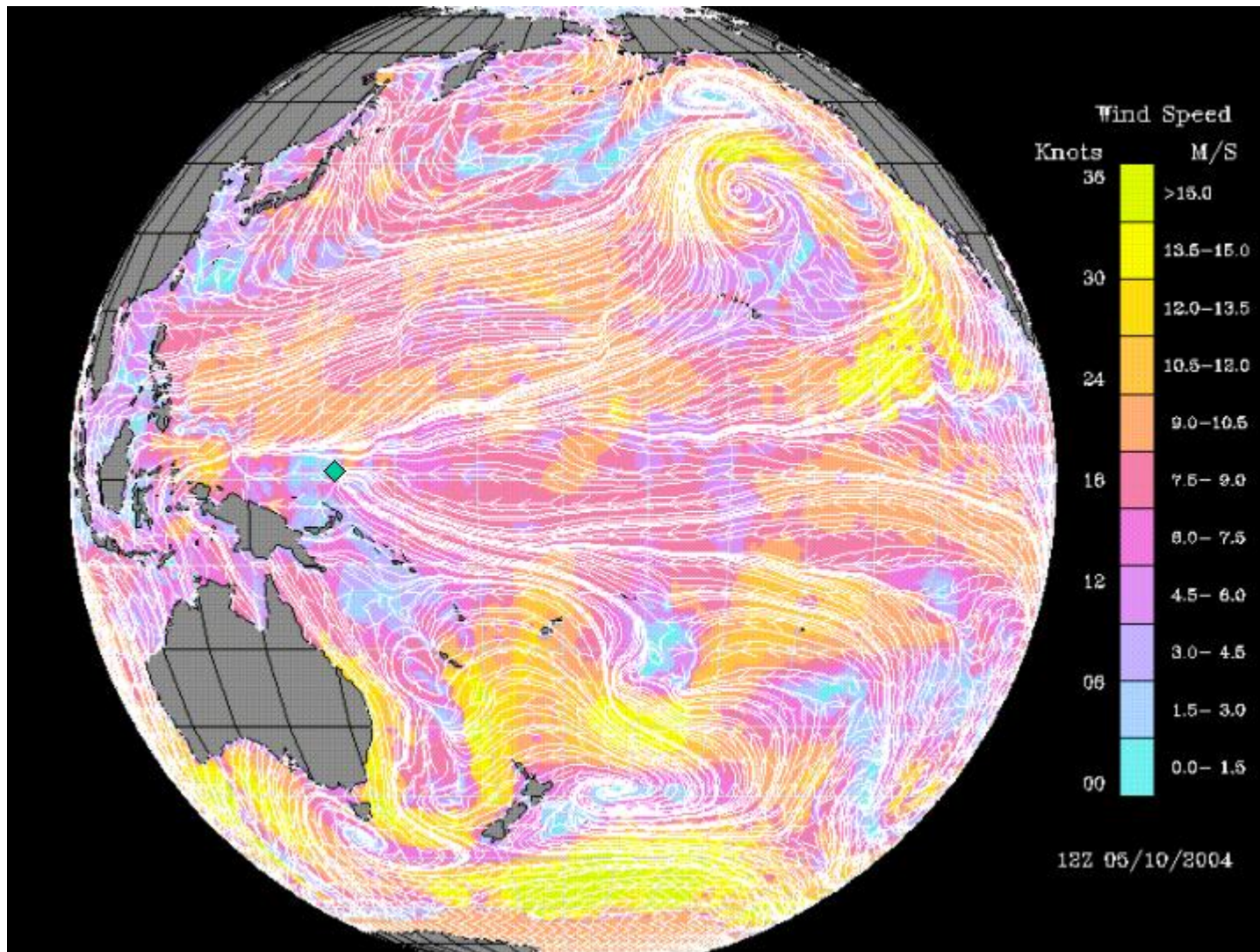


The NOAA CMDL Carbon Cycle Greenhouse Gases group operates 4 measurement programs. In situ measurements are made at the CMDL baseline observatories: Barrow, Alaska; Mauna Loa, Hawaii; Tutuila, American Samoa; and South Pole, Antarctica. The cooperative air sampling network includes samples from fixed sites and commercial ships. Measurements from tall towers and aircraft began in 1992. Presently, atmospheric carbon dioxide, methane, carbon monoxide, hydrogen, nitrous oxide, sulfur hexafluoride, and the stable isotopes of carbon dioxide and methane are measured. Group Chief: Dr. Pieter Tans, Carbon Cycle Greenhouse Gases, Boulder, Colorado, (303) 497-6678 (pieter.tans@noaa.gov, <http://www.cmdl.noaa.gov/ccgg>).

Additional US/NZ Trace Gas Flask Sampling



May 2004 Surface Winds



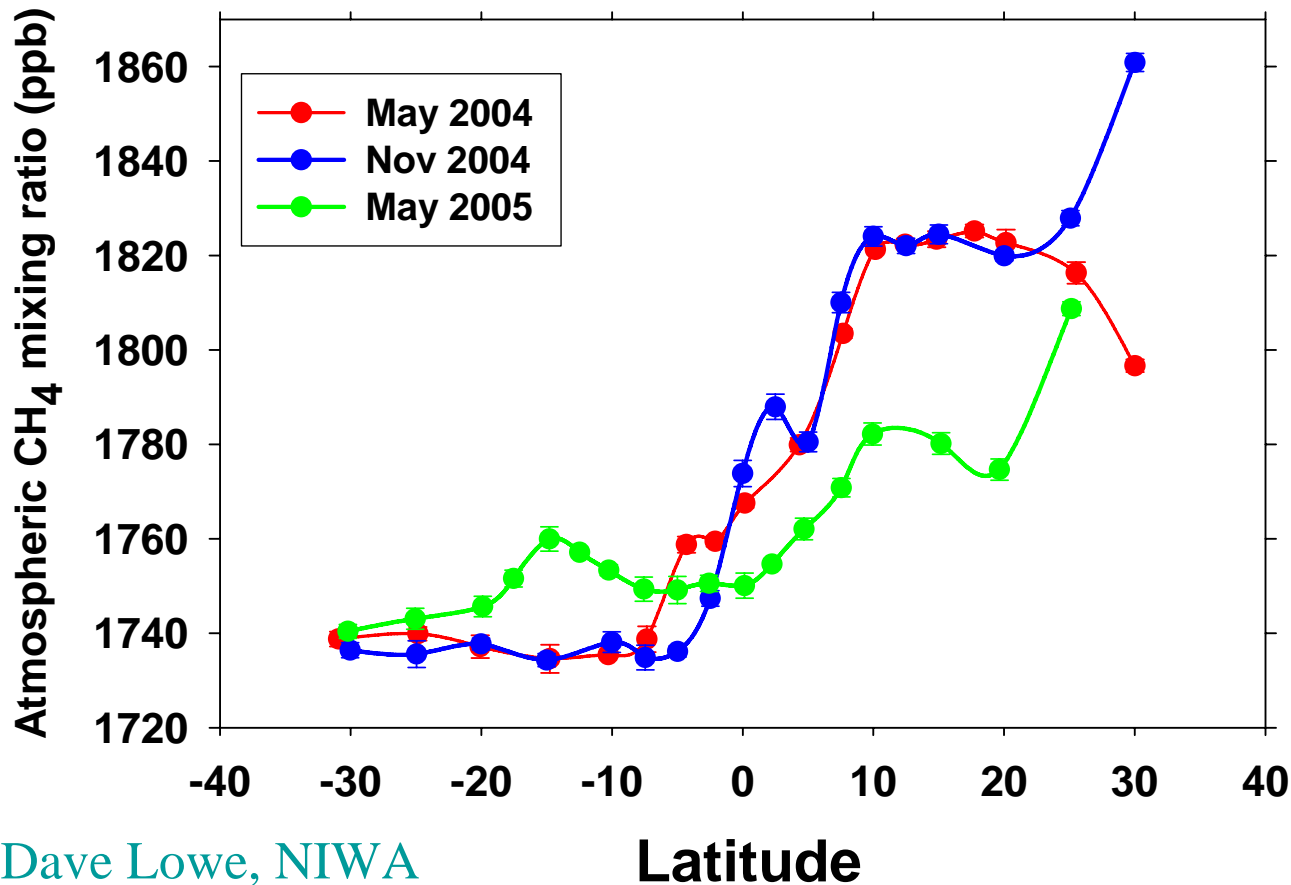
Additional US/NZ Trace Gas Flask Sampling



Additional US/NZ Trace Gas

Flask Sampling – Methane Transport

Fuji Transworld Voyages 2004 and 2005
Nelson, New Zealand to Osaka Japan



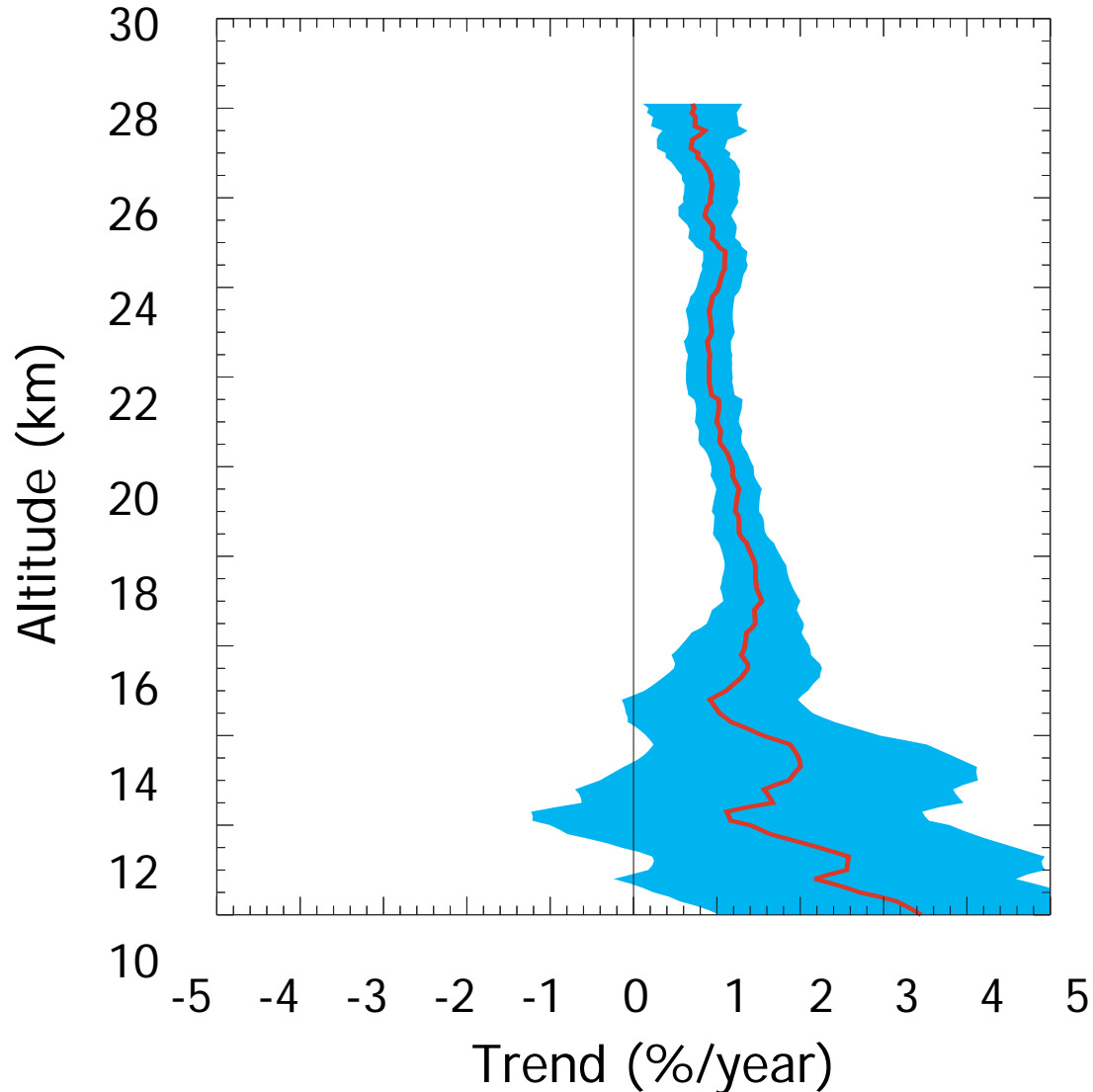


Additional US/NZ Trace Gas Flask Sampling New Ship (First Sampling Voyage May 2006)





Trend of Water Vapor Over Boulder, CO (Begun in Lauder, NZ in August 2004)





Pacific Island Climate Data Rescue and Digitization (PI-CLIDAT)

- Paper records of daily meteorological data from across the Pacific Islands Region, and resident at NIWA in Auckland
- NZ Lead is Jim Salinger from NIWA
- Completed in 2004
 - Daily Data for Alofi, Niue digitized for the periods of 1905-1934 and 1960-1971
- In Progress for 2005
 - Niue – Daily data from 1935-1959 for Alofi station
 - Kiribati – 102 years of data from 5 stations (planning)
 - Tokelau – 19 years of data from 1 station (planning)
- Future Plans for 2006-2008
 - Pitcairn Island – 27 years of data from 1 station
 - Samoa – 12 years of data from 1 station
 - Tonga – 97 years of data from 3 stations
 - Tuvalu – 81 years of data from 3 stations
 - Cook Islands – 208 years of data from 6 stations

Data Preservation and Rescue



PACRAIN – Capacity Building

“The objective is to compare the accuracy of the Tipping Bucket Raingauge with the SPaRCE Raingauges & Others [Tilting Siphon & Manual Raingauge]”.

**Tipping
Bucket**



**Tilting
Siphon**



SPaRCE



**Manual
Raingauge**





Keys to Regional GCOS Success



- **Need to have a focused regional organization that is willing to take up the mantle of advancing GCOS in the region; a full-time regional program officer is a key requirement. In the Pacific Region, SPREP was a natural focus for this**
- **Need a solid and consolidated planning mechanism to advance projects in the region**
- **Need to identify partners and donors willing to participate in regional projects and/or contribute resources; equally important are engaged and willing nations in the region**
- **Leveraging upon existing bi-lateral and multi-lateral agreements that can incorporate GCOS projects is a key factor to consider (e.g., US/New Zealand Climate Change Partnership, US/Australia Climate Action Partnership, and Global Observing System of Systems)**



Keys to Regional GCOS Success (cont)



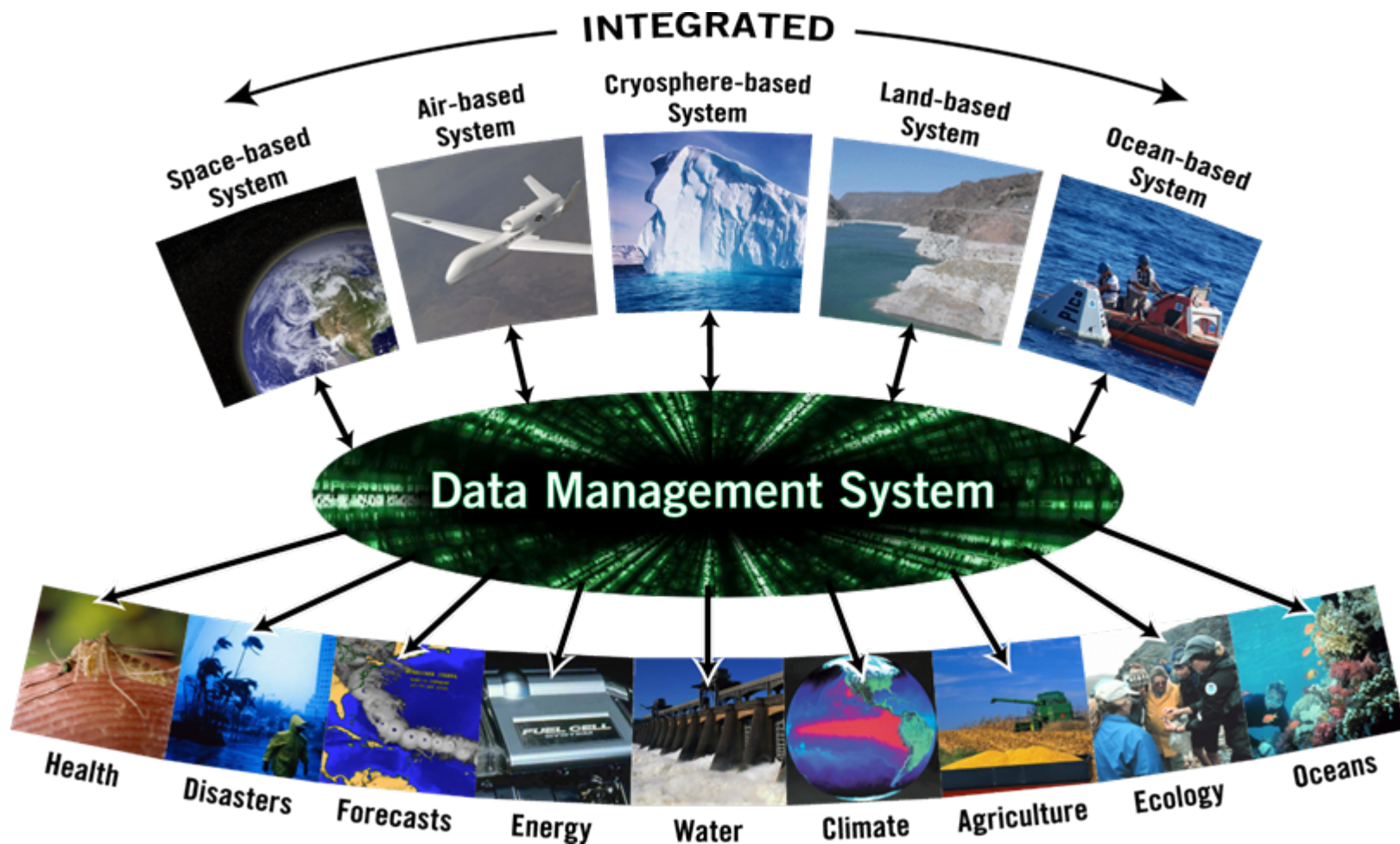
- In order to ensure success, some kind of sustained regional steering or leadership group is required; communication with GCOS Secretariat and GCOS SC is important
- Allows for monitoring of the progress of projects, participation in fund raising, and more importantly is an avenue for GCOS advocacy in the region
- Representation needs to consist of persons with interest in advancing GCOS in the region rather than being based upon national representation
- Broad-based membership - Partners need to come from inside and outside the meteorological community; GCOS is more than a meteorological system
- One key to success in the Pacific has been to advance PI-GCOS from the “grass-roots”

Part III – Advancing GCOS in other Regions



Global Earth Observation System of Systems

Integrated Observations & Data Management



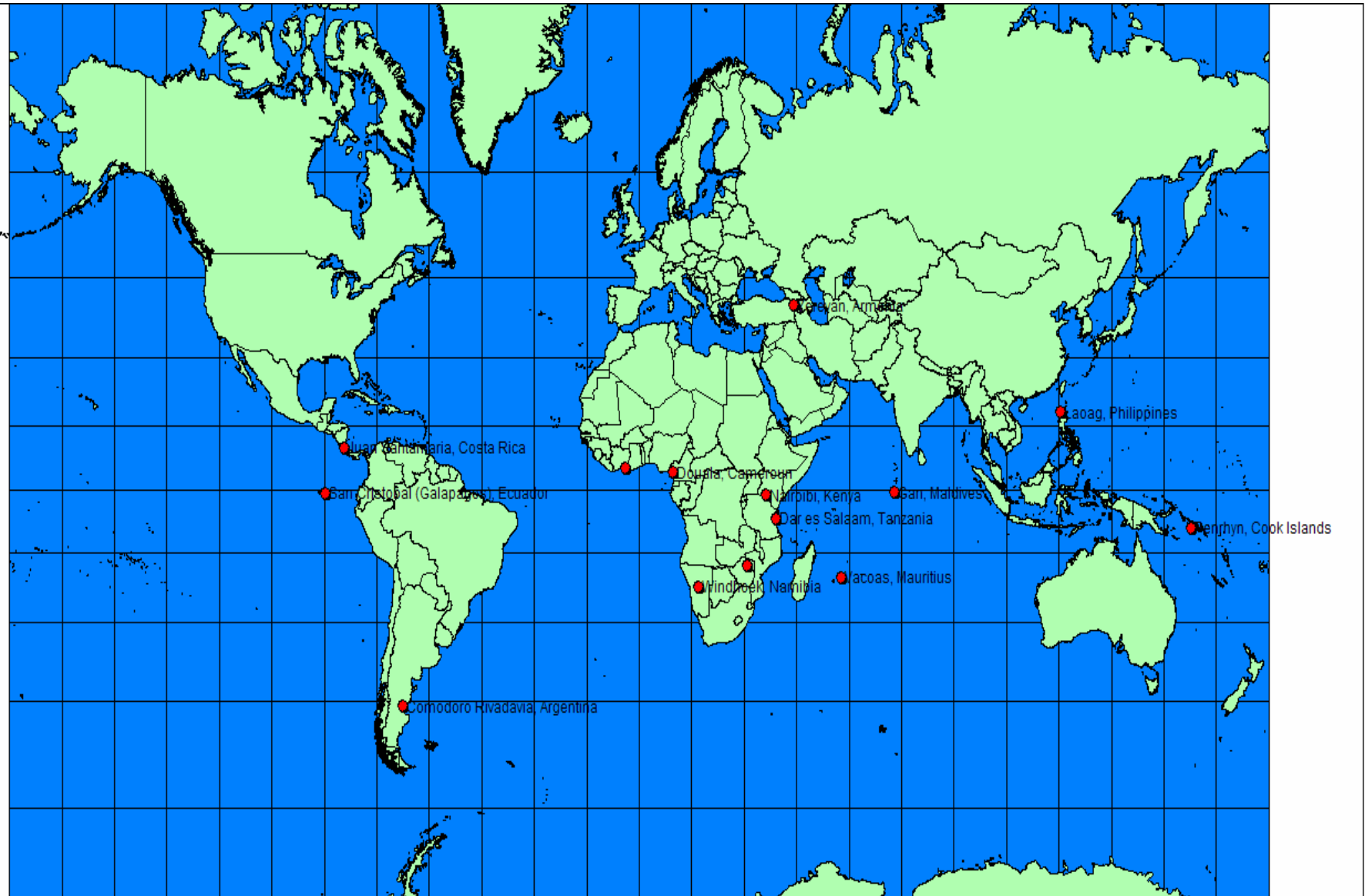
The Vision

Build a network that 50 years from now can with the highest degree of confidence answer the question:

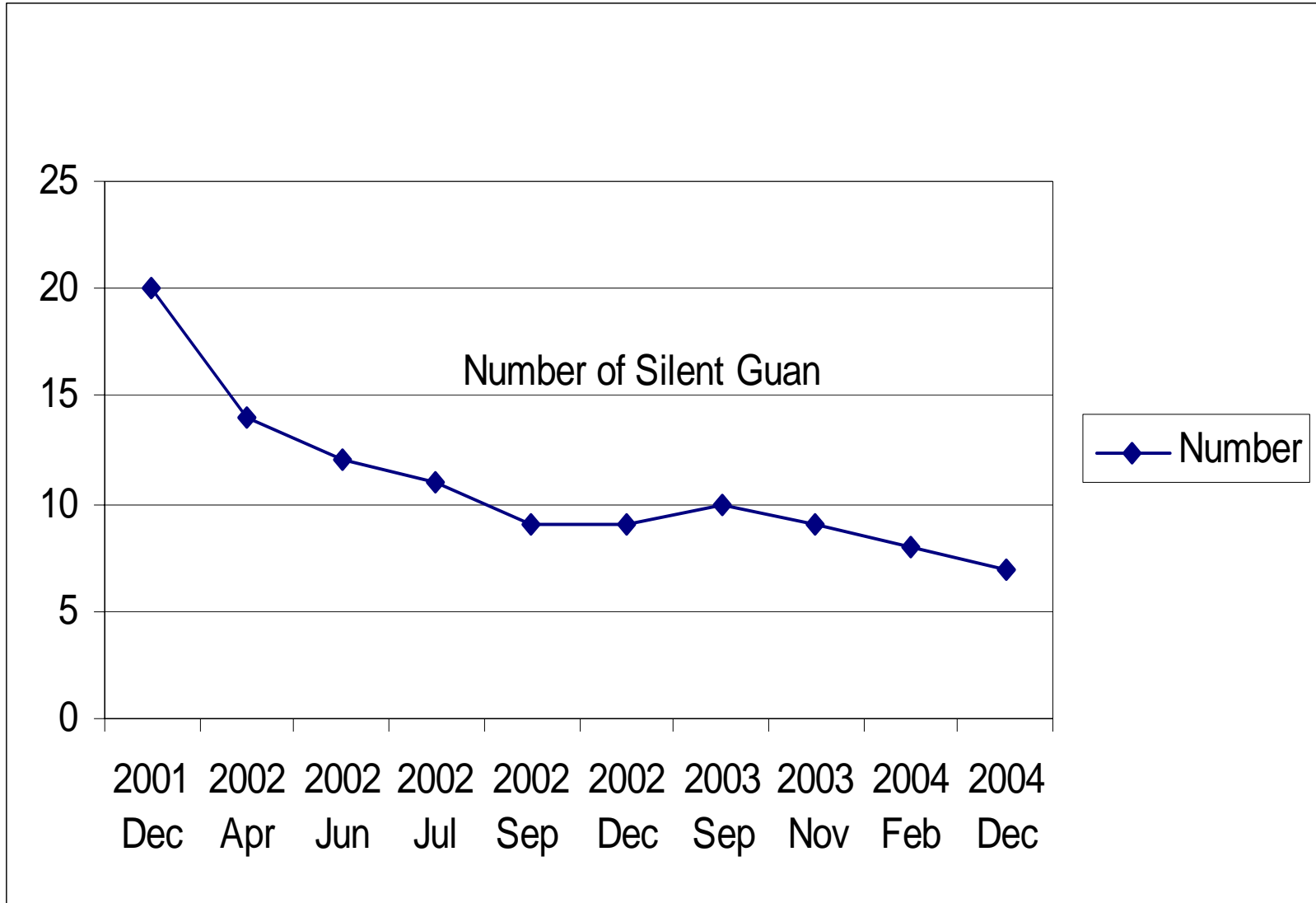
How has the climate of the Globe changed over the past 50 years?



GUAN Stations Assisted to Date



GCOS Upper Air Network (GUAN)

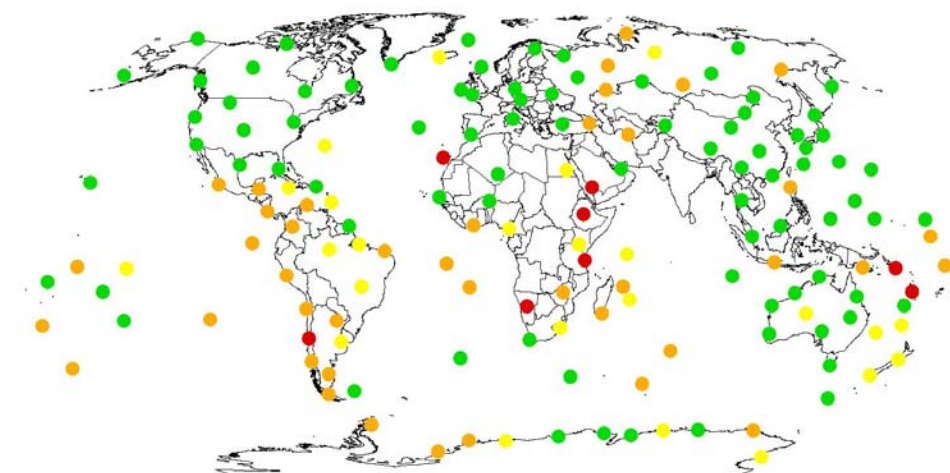


GUAN Performance Improvement From 2001-2004

2001 GUAN Station Sounding Completeness
(at least one mandatory level reported)
00 & 12 UTC

Percent of Possible Soundings

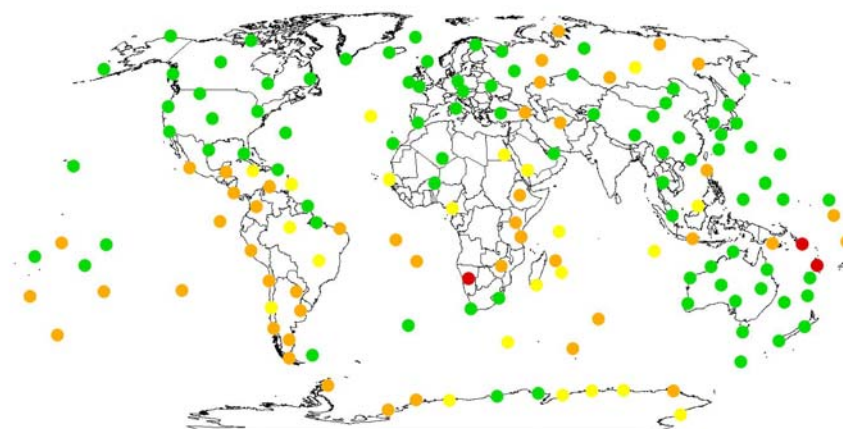
- 0.00
- 0.01 to 49.99
- 50.00 to 89.99
- 90.00 to 100.00



2004 GUAN Station Sounding Completeness
(at least one mandatory level reported)
00 & 12 UTC

Percent of Possible Soundings

- 0.00
- 0.01 to 49.99
- 50.00 to 89.99
- 90.00 to 100.00

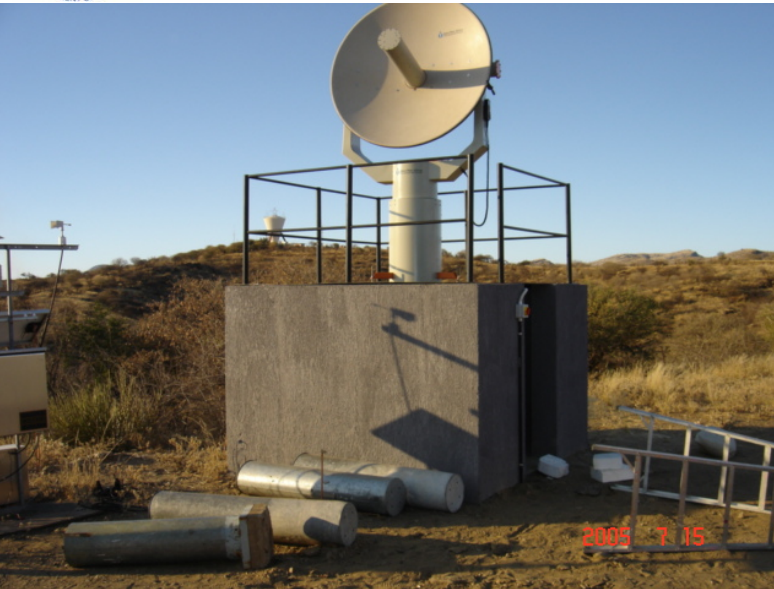




New GUAN Station at Dar es Salaam, Tanzania



Windhoek, Namibia



New GUAN Station at Gan, Maldives



Yerevan, Armenia



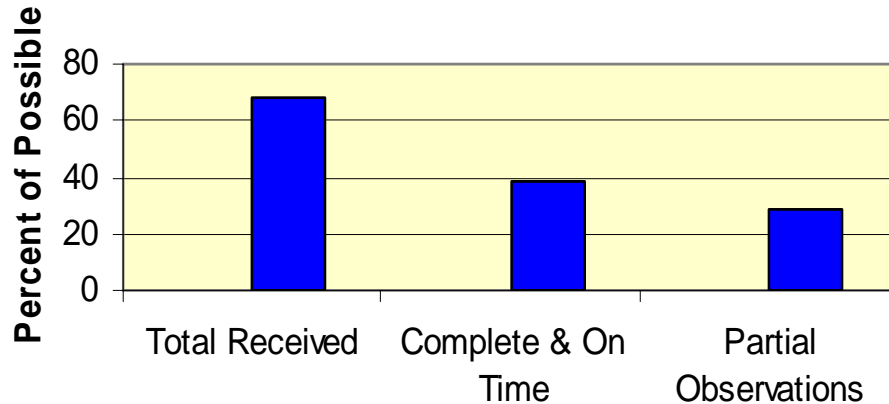


GCOS Technical Support Centers

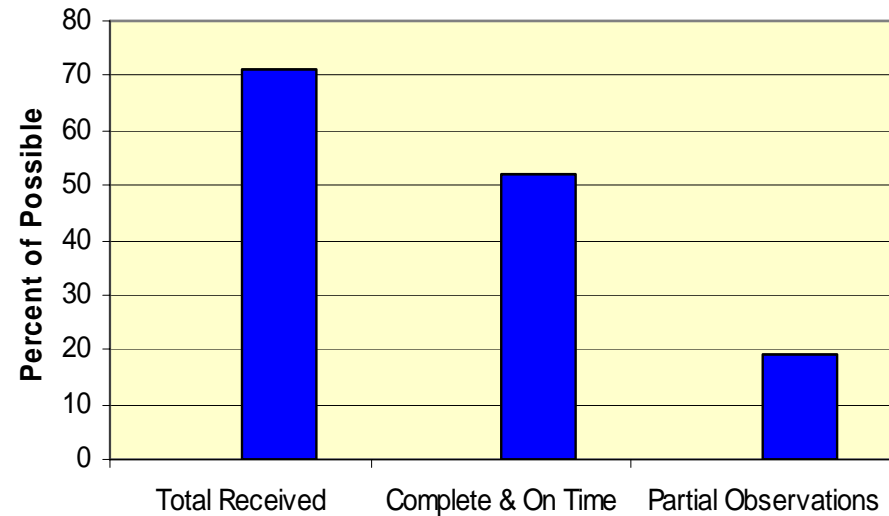
- Three Active Sites
 - Pacific Islands (Based in New Zealand)
 - Eastern and Southern Africa (Botswana)
 - Caribbean and Central America (Florida)
- Functions
 - Visit each GUAN 2 times per Year
 - Visit as many GSN as Possible
 - Actively Monitor all GUAN/GSN
 - Up to 3 Unscheduled Repair Missions/Year
 - Training and Calibration
 - Limited Common Spare Parts
 - Quarterly Reports

GCOS Technical Support Centers

**Performance of 7 GUAN Sites Prior to
Contract Support
July 2003 thru June 2004**
Expected 2555
Total Received 1738
Complete 999
Partial 739



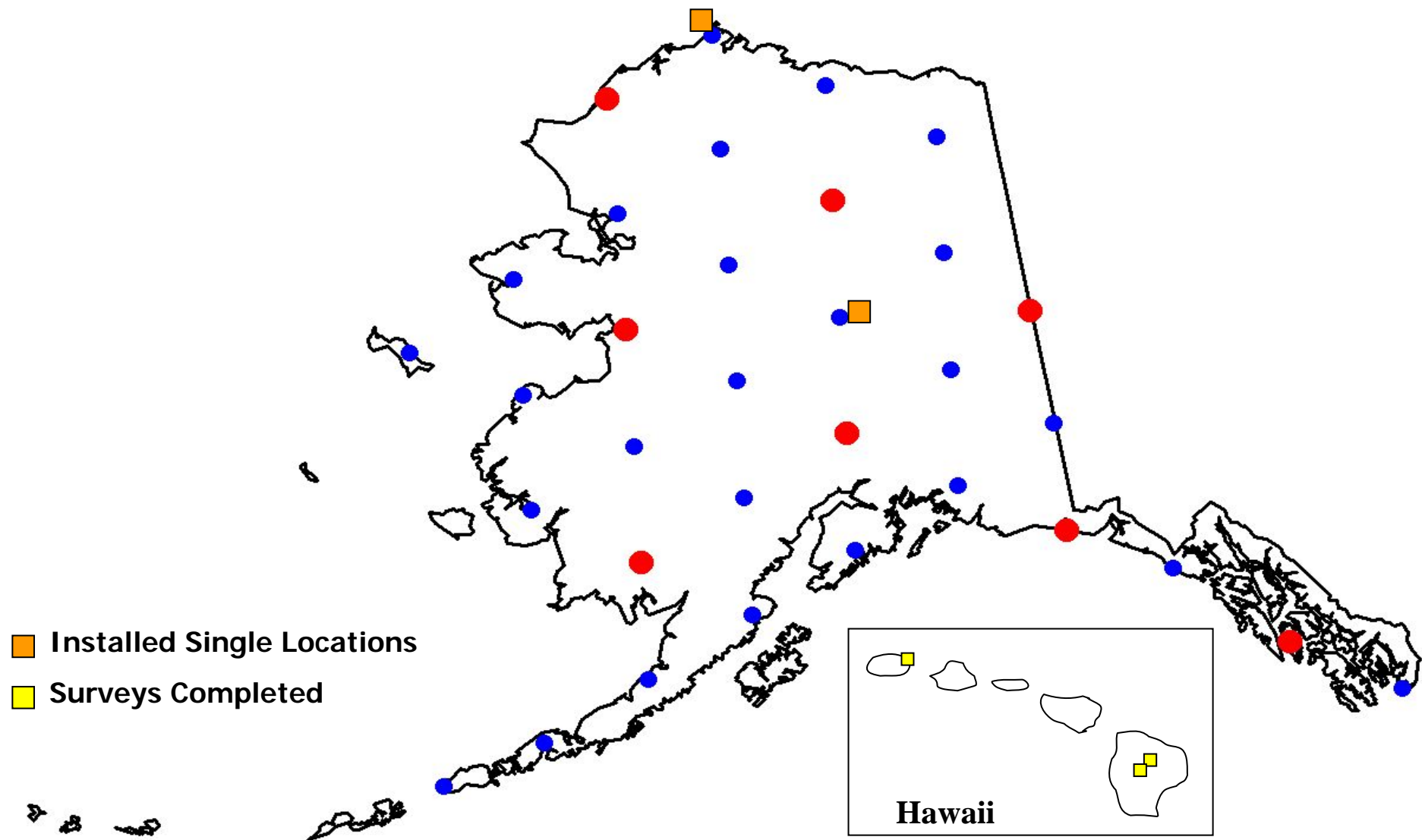
**Performance of 7 GUAN Sites with Contractor
Support July 2004 thru June 2005**
Total Expected 2555
Total Received 2168
Complete Obs 1644
Partial Obs 524



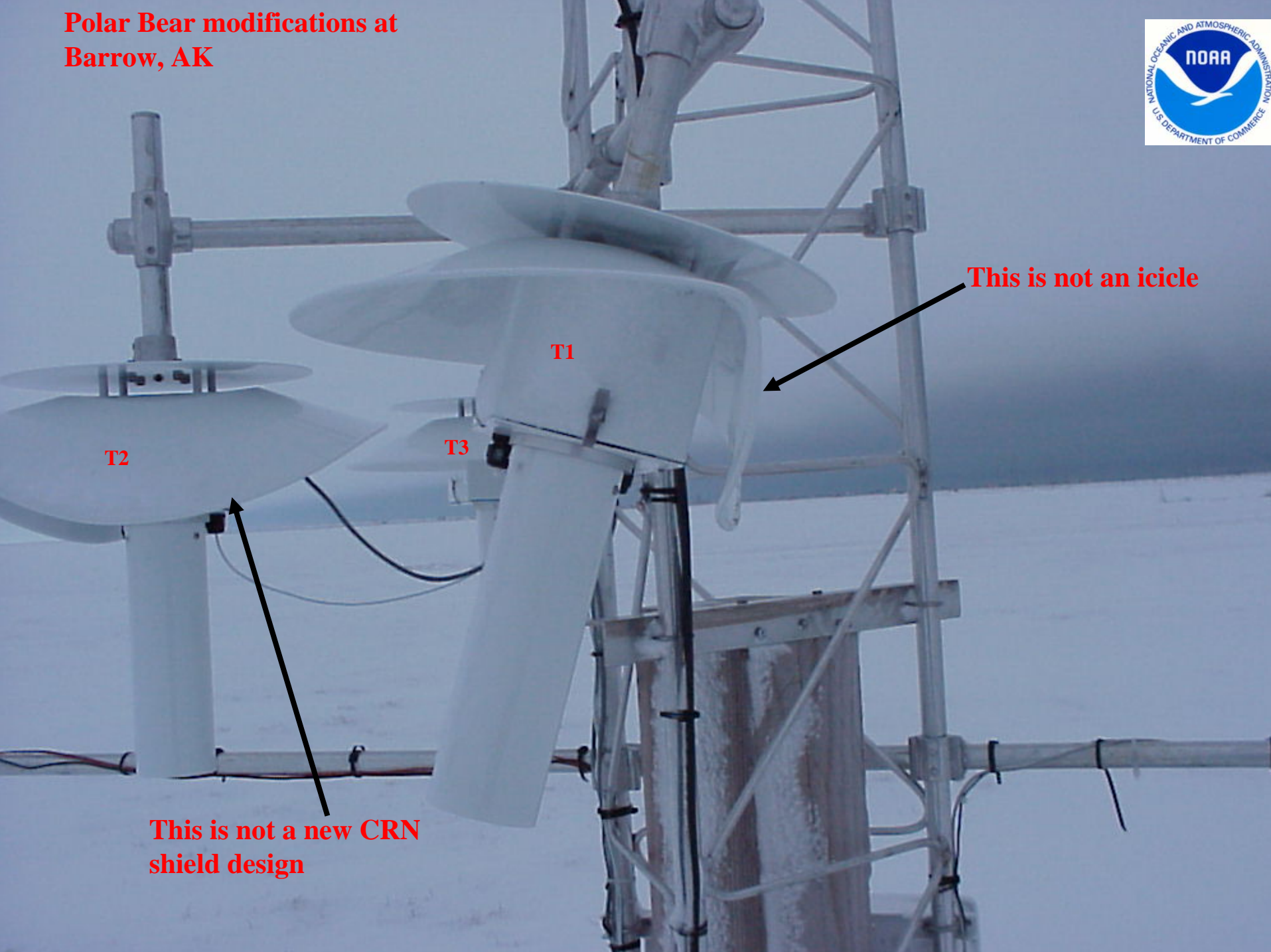
Receipt of Total Observations Increased by 430 Observations or 29%
Receipt of Complete Observations increased by 655 Observations or 76%
Reduced Number of Partial Observations by 225 observations or 36%

Initial USCRN Alaska Locations

(8 Paired/25 Single = 41 Instrument Stations)



Polar Bear modifications at Barrow, AK



T1

This is not an icicle

T2

T3

This is not a new CRN
shield design



Other Critical Hi-Latitude & Mountain Environments

- **Tropical mountain glaciers**
 - **American Cordillera (CORDCLIM)**
 - Quelcayya, and its Middle American sisters
 - Kilimanjaro, and its African sisters
 - **Owen Stanley Mountains (Papua New Guinea)**
- **Mid-Latitude Mountains**
 - Southern Alps (New Zealand)
 - The European Alps and Dalmatian Pennines
 - The Urals, the Pamirs
 - The Folded Ranges and the Himalayas
- **Arctic/Antarctic locations (e.g., IPY)**
 - **Tiksi, Russian Arctic (2007-08)**
 - **South Pole Station**



Advancing GCOS in South America



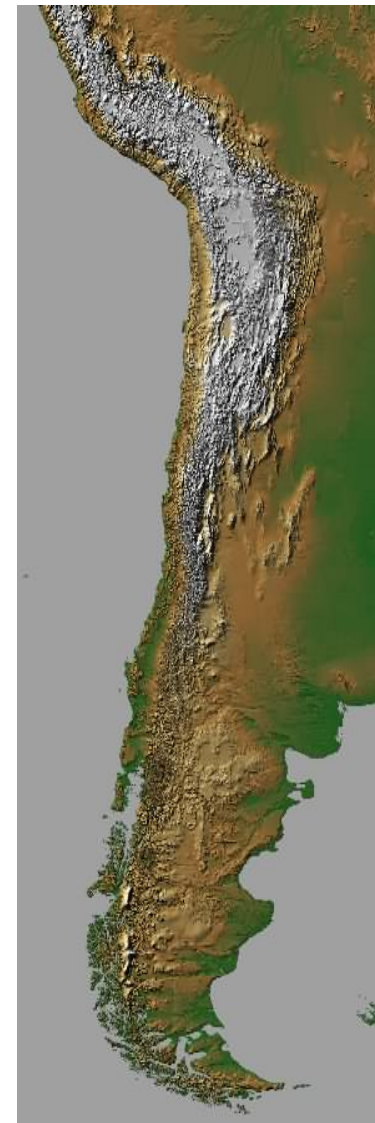
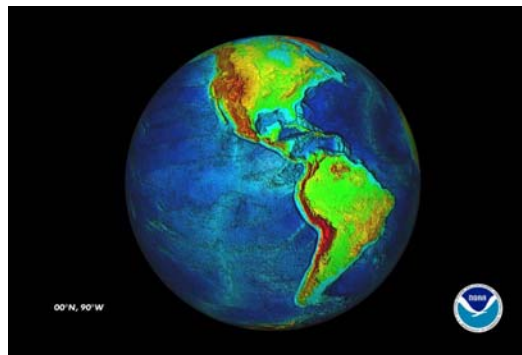
- **Regional South American GCOS Workshop held in Santiago, Chile in October 2003**
- **Follow-up Regional Action Plan meeting held in Buenos Aires in 2004**
- **Regional Action Plan can be found at the following sites**
 - **Spanish:**
http://www.wmo.ch/web/gcos/RWSA_Action_Plan_Spanish.pdf
 - **English:**
http://www.wmo.ch/web/gcos/RWSA_Action_Plan_English.pdf
- **Opportunities exist to further GCOS cooperation in the region:**
 - **CONCORD Meeting in Mendoza, Argentina 4-6 April 2006**
 - **8th ICSHMO Conference**
 - **World Climate Program Conference in Montevideo, Uruguay 15-17 May 2006**
 - **Rodney Martinez, CIIFEN; Carolina Vera, University of Buenos Aires; Carlos Nobre, CPTEC/INPE; Rodrigo Nunez, Chilean Navy; etc.**
 - **Earth Observation Partnership for the Americas (EOPA); a regional implementation of GEOSS**
 - **CORDCLIM (High altitude observing in the Cordillera)**

Climate Instrumentation of the Great American Cordillera

[“CORDCLIM”]

Combination of Instrumentation & Services

- National Meteorological Services
- Research Institutions across the Region
- US Climate Research Network Instrumentation
- Coordinated Data Management at NCDC
- **Partnership with World Bank**
- Open Participation



Cotopaxi, Ecuador 6000m

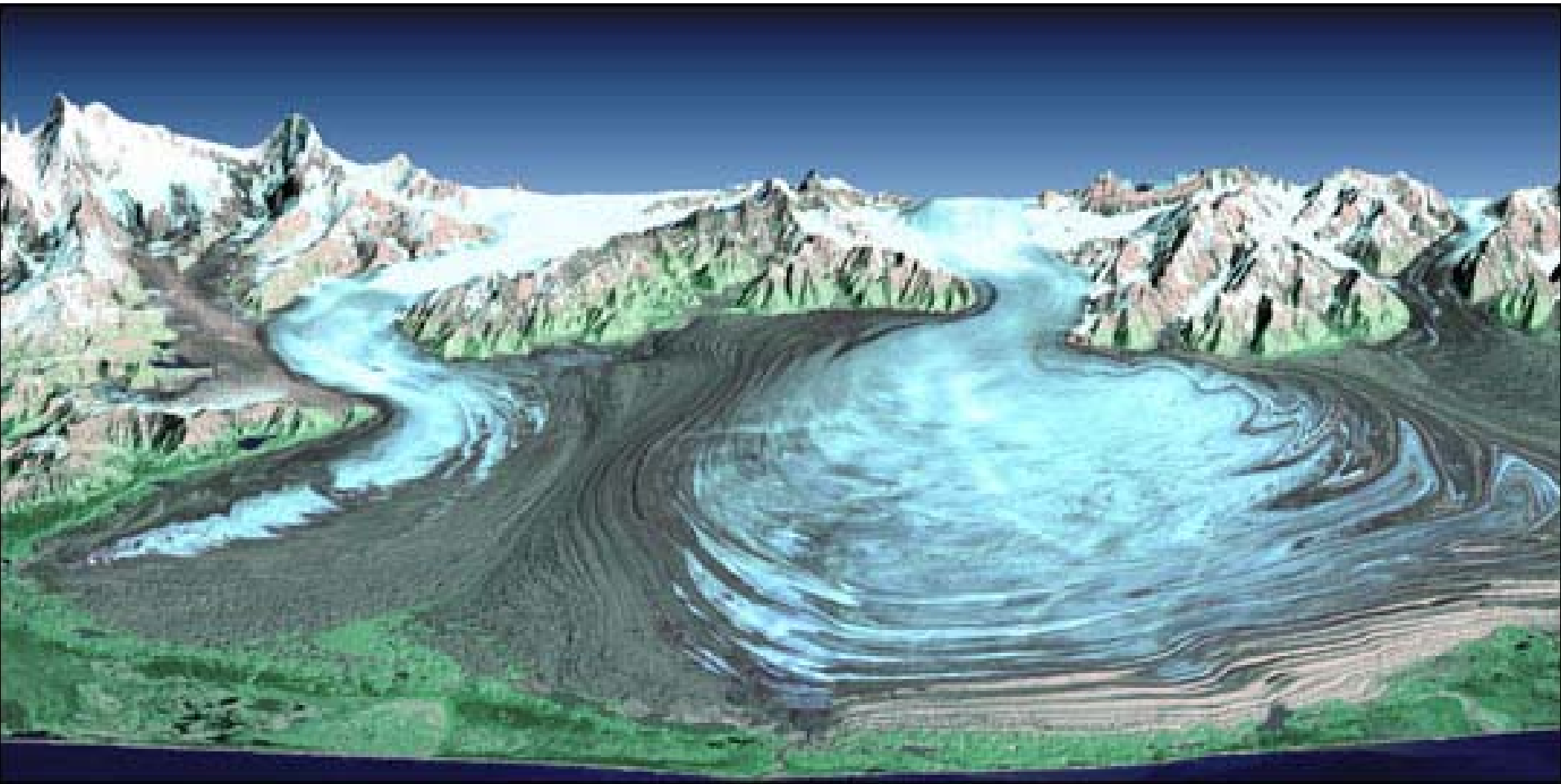


Aconcagua, Arg. 6280m



Malaspina Glacier

(Landsat (2000), STS Radar (2002))



**Upsala Glacier, Argentina, 1928 (top) vs 2004 (bottom)
[From Time Magazine – March 3, 2006].**



Access & transport may be difficult...





US GCOS Web Site

<http://www.ncdc.noaa.gov/oa/usgcos/index.htm>



USGcos Home Page - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://www.ncdc.noaa.gov/oa/usgcos/index.htm

Getting Started Latest Headlines

Incident Queue USGcos Home Page

U.S. Global Climate Observing System

NOAA's National Climatic Data Center

[Home](#) [Contacts](#)

About US GCOS

- [Program Description](#)
- [Meetings & Events](#)
- [Presentations](#)
- [Reports](#)
- [Resource Links](#)

Programs

- [GCOS Improvement Programs](#)

US GCOS

Mission:

To improve global atmospheric climate observing through a diverse and integrated set of global, regional, and bi-lateral observing activities.

Goals:

- Monitoring the impacts of and the response to climate change
- Early detection of climate change due to human activity
- Improving data for impact analysis
- Reducing major uncertainties in long-term climate activities

[Accessibility for users with disabilities](#)

<http://www.ncdc.noaa.gov/oa/usgcos/index.htm>

Downloaded Thursday, 27-Apr-2006 19:53:05 EDT

Last Updated Wednesday, 05-Apr-2006 13:47:20 EDT by Christina.Lief@noaa.gov

Please see the [NCDC Contact Page](#) if you have questions or comments.

Done

start Inbox for howa... USGcos Home ... 2 Windows E... Diamond GCOS... VZAccess Mana... 7:56 PM

The United States Detailed National Report on Systematic Observations for Climate:
United States Global Climate Observing System
(U.S.-GCOS) Program



**Compiled on Behalf of the
United States Government by:
United States Department of Commerce
National Oceanic and Atmospheric Administration
National Environmental Satellite, Data, and Information Service
August 2001**

Thank You
Any Questions??

